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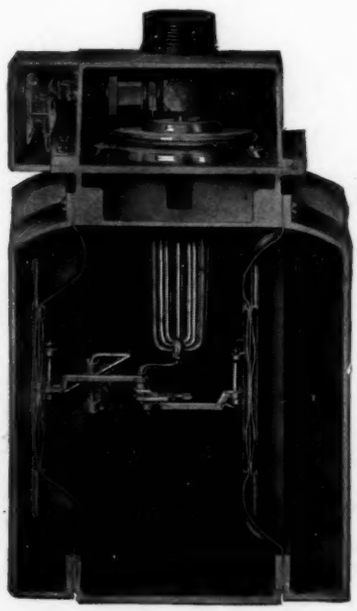
SPRAGUE STANDARD METERS



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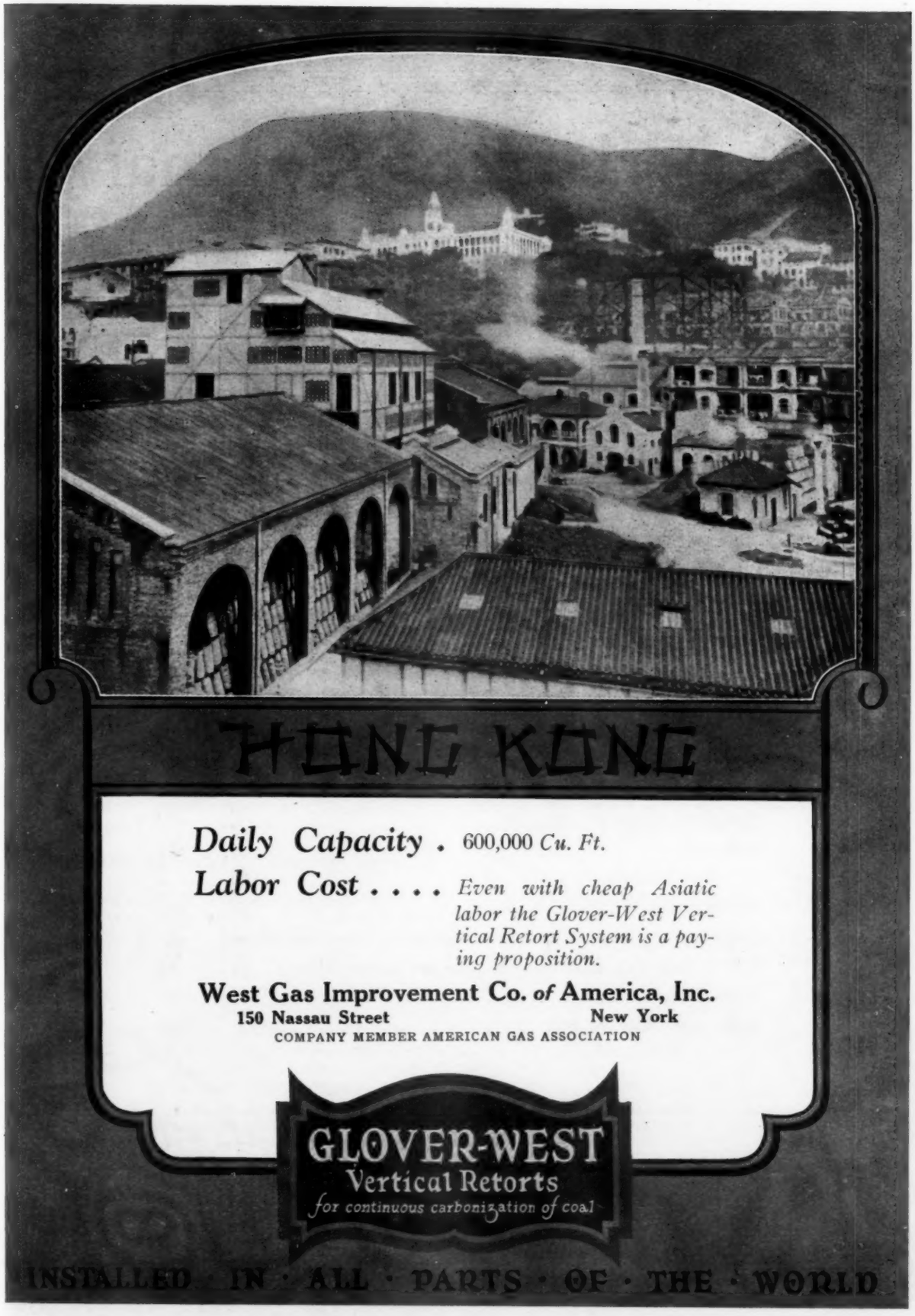
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# American Gas Journal

*SIXTY-FIFTH YEAR*

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# The Fuel of the Future --What Shall It Be?

## Calculation of the fuel required to heat a house

*Ismar Ginsberg*

IN THE three previous articles on the general subject of house heating, the house heating business was discussed from the economic phase, the various systems of house heating that are in present use were described and their advantages and disadvantages were explained and finally the general formula for the amount of heat, that has to be supplied to a house or to a room in order to keep it at a given temperature, was developed. It is now necessary to indicate how this formula is used and how the quantity of gas, that must be burnt in order to maintain the temperature of a room or of a house at a specified point, can be found by mathematical calculation. The general principles, on which this calculation is based have heretofore been discussed in detail and need no further exposition at this point.

### General Formula for House Heating

The general formula for house heating, which was given in the preceding articles, is repeated here, as follows:

$$H = A + B - C.$$

In this formula, as has been explained, H is the total heat that must be supplied to maintain the room or house temperature at the proper point, A is the heat lost by transmission through the walls of the buildings, etc., B is the heat that is consumed in heating up the air that enters the room either naturally or artificially for ventilating purposes, and C is the heat that is derived from other sources besides the furnace in which the fuel is burnt. The factor A may be considered to be made up of two parts. One of these is the heat lost by the leakage of warm air around doors and windows and through the leaky, cracked walls themselves and the other is the heat that is consumed in heating up the air required for ventilation.

### Loss of Heat Through Walls and Windows

The loss of heat through walls and windows will take place through the combined action of radiation, convection and conduction. Thus, for example, the external wall or window will lose heat by radiation, by the convection of air currents which come in contact with it and of course by conduction, that is, by direct passage of the heat from the interior of the building through the wall to the exterior. The calculation of the heat loss through the walls and windows of a building is therefore a fairly complicated problem. It involves the use of rather complex equations and formulae and depends on a number of constants which are concerned with the specific conductivity of various substances, as well as with the specific radiation loss from different surfaces.

### Heat Loss by Radiation

The first part of this heat loss is the heat transmitted by radiation. This may be expressed in the form of a formula, as follows:

$$Q = D \left[ \left( \frac{T_2}{100} \right)^4 - \left( \frac{T_0}{100} \right)^4 \right]$$

In this formula $T_0$ is the absolute temperature of the receiving body, $T_2$ is the absolute temperature of the radiating body, D is a constant and Q is the number of B.t.u. radiated per square foot per hour. This formula states that the number of heat units, which are radiated from a hotter body to a colder one per square foot area per hour, is dependent upon the difference between the fourth powers of the absolute temperatures of the two bodies.

Thus, in this case the hotter body is the wall and the colder body the surrounding air, and in order to be able to tell how much heat is lost through the walls and windows by radiation it is first necessary to know the temperatures of the external air and of the walls and windows and also the material from which they are made. As is known, absolute temperatures are found merely by adding 460 degrees to the regular temperature.

### The Values of D

The important factor in the formula is D. D is a very useful factor and the following table gives some of the values of this quantity. They will be seen to vary very considerably and to be material dependent on the character of the substance.

### Value of the Radiation Constant D

| Kind of Material | Value of D |
|---|---|
| Glass, smooth | 0.154 |
| Brass, dull | 0.036 |
| Copper, slightly polished | 0.0278 |
| Wrought iron, dull | 0.154 |
| Wrought iron, clean and bright | 0.056 |
| Cast iron, rough | 0.157 |
| Lime plaster, rough, white | 0.151 |
| Slate | 0.115 |
| Red sandstone, finished smooth | 0.100 |

(From Mechanical Equipment of Buildings, Harding and Willard)

### Use of the Formula

The use of the formula is very simple. One example is given below. Thus, assume that the inside temperature of the room is 70 degrees F and that the outside temperature of the air is 30 degrees F. It is desired to find the amount of heat radiated through two square feet of glass surface in windows. The absolute temperatures are 530 and 490, respectively, and the coefficient D is 0.154 (from the above table). These figures are substituted in the formula as follows:

$$Q = 0.154 \left[ \left( \frac{530}{100} \right)^4 - \left( \frac{490}{100} \right)^4 \right]$$

$$= 0.154\ (789 - 573) \text{ or } 33.2$$

This means that 33.2 B.t.u. will be radiated by the glass window pane one square foot in area every hour as long as the temperature remains 70 degrees F inside the room and 30 degrees F outside of the window. For two square feet of window glass surface the radiation loss will be 33.2 × 2 or 66.4 B.t.u. per hour. The heat that is supplied through the hot air register or from the radiator must be sufficient to take care of this amount of radiation.

### Combined Radiation and Convection

Air currents beat against the window pane surface and the surface of the brick or wooden walls and conduct the heat away by convection as well as by radiation, which makes it a very difficult matter to differentiate between the two. It is, however, possible to obtain the combined heat loss, that is, the heat lost by both radiation and convection. A combined coefficient is used for this purpose, and this factor will be dependent on the rapidity with which the air moves past the wall or window. It is clear that the amount of heat convected away from the surface will differ as the velocity of the air moving over the surface of the same increases.

Thus, when the air is still, various values for the coefficient K, which are used in the calculations are given in the following table:

| | |
|---|---|
| Brickwork | 1.35 to 1.40 |
| Concrete | 1.30 |
| Corkboard | 1.25 |
| Cement plaster finish | 0.93 |
| Glass window | 1.50 |
| Sheet asbestos | 1.40 |
| Magnesia board | 1.45 |
| Wood (finished surface) | 1.40 |

### Effect of Movement of Air

On the other hand, when the air is moving, that is, when a wind is blowing, which naturally results in a greater amount of heat being convected away from the radiating surface, these factors must be multiplied by still another factor, which is directly dependent on the velocity of the wind. These multiplying factors can be obtained from the following tabulation:

| Velocity in miles per hour | Multipliers of K | |
|---|---|---|
| | Brickwork | Wood |
| 5 | 2.38 | 2.19 |
| 10 | 3.20 | 2.71 |
| 15 | 3.76 | 2.95 |
| 20 | 4.22 | 3.02 |

### The Conductivity Factors

The conductivity factors are used in determining the amount of heat that is transmitted through the walls, etc., of a house by conduction, so that the amount of heat to be supplied can be ascertained. Besides these factors, there are also other factors of heat conduction which are expressed in terms of B.t.u. transmitted through one inch thickness of the material per square foot area per degree difference in temperature (Fahrenheit) per hour. Some of these conductivity factors are given in the following tabulation.

The figures represent B.t.u. transmitted per square foot per hour through one inch thickness per degree F. difference in temperature of the two surfaces:

| Material | |
|---|---|
| Brickwork | 5.00 |

| | |
|---|---|
| Concrete (stone 1, 2, 4 mixture)..... | 8.30 |
| Wood (fir) ⅞ inch thick..... | 1.00 |
| Corkboard insulation ..... | 0.32 |
| Corrugated asbestos board..... | 0.48 |
| Sheet asbestos ..... | 0.29 |
| Magnesia board ..... | 0.51 |

### Use of the Factors

All the factors that are required for determining the quantity of heat that is transmitted through the walls of the building, the glass windows, etc., are now known. In other words, it is now possible to calculate the value of the symbol A in the general formula $H = A + B - C$.

In this connection it will be remarked that the internal construction of the walls is different from the external and similarly that the temperature of the wall on the inside is different from the temperature of the wall on the outside. This makes the calculation a little more complicated than it would ordinarily be.

### Assumptions Made

It is assumed that the coefficient of combined radiation and convection is $K_1$ for the inside wall, $K_2$ for the outside wall, depending on the material of which the wall is made. The temperature of the inside air is t, that of the inside wall surface $t_1$, that of the outside air $t_0$ and finally that of the outside wall surface $t_2$. It is therefore clear that the heat absorbed by the inside wall must be equal to the difference in temperature between the inside air and the inside wall surface, multiplied by the proper factor. This will give the number of B.t.u. absorbed by the inside wall surface per square foot per hour. Similarly the difference between the temperature of the outside surface of the wall and that of the external air, multiplied by the proper factor, will give the number of B.t.u. per hour that are given off by the outside wall surface. It is also clear that these two heat quantities must be equal to each other. Thus we have the following equation:

$$K_1 (t - t_1) = K_2 (t_2 - t_0)$$

### Heat Conduction Through Wall

As far as the conductivity of the wall or window glass is concerned, it is necessary to employ another formula which will yield the number of B.t.u. transmitted by conduction per square foot per hour. In this formula C is taken to denote the heat conductivity factor, that is, the number of B.t.u. conducted per hour per degree difference in temperature (Fahrenheit) per inch thickness per square foot area of surface, and X is the thickness of the wall in inches. The temperature of the inside wall surface is still $t_1$ and that of the outside wall $t_2$. This gives the following formula for the heat conducted through the wall per square foot per hour, $\frac{C}{X}(t_1 - t_2)$.

### Equality of Quantities of Heat

It is evident that the amount of heat that is received from the heated air by the inside wall, the amount of heat that is conducted through the wall and the amount of heat that is yielded by the external surface of the wall must be equal to one another. Thus if the symbol Q is taken to denote the heat that is transmitted and lost through the wall per square foot per hour per degree difference in temperature of the air on the two sides of the same, the following equations may be written:

$$Q (t - t_0) = K_1 (t - t_1) = \frac{C}{X}(t_1 - t_2) = K_2 (t_2 - t_0).$$

From these equations the following general equation can be derived, which, it will be noticed, does not contain any of the temperature factors:

$$Q = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{X}{C}}$$

The values of the constants are of course found from the tabulations that have been given above. While it is not usual to have to go through such a calculation, as is indicated in the above equation, for the reason that there are tables which give the values that are required in determining the heat loss through various kinds of walls, etc., nevertheless, an example of such a calculation will be briefly described below so that it may be seen just how it is carried out.

### Example of Calculation

Thus it may be assumed that the wall is 15 inches thick and is made of brick. Then from the above tables the values of the constants $K_1$, $K_2$ and C are as follows: 1.4, 4.2 and 5. The value 4.2 is obtained by multiplying the constant 1.4 (from the tabulation) by 3 to take care of the wind velocity on the outside of the brick wall and its greater effect in removing the heat from the wall. It is common to use the factor 3 in making this calculation. It is known that the thickness X is 15.

Hence the equation for Q becomes as follows:

$$Q = \frac{1}{\frac{1}{1.4} + \frac{1}{4.2} + \frac{15}{5}} \text{ or } 0.247.$$

Now if the inside temperature of the air is 75 degrees F. and the outside temperature 25 degrees F., the difference in temperature will be 70 degrees. When this difference in temperature is multiplied by 0.247, there is obtained the value 17.3 B.t.u. or the heat which is conducted or lost through the wall per hour per square foot of surface. If the surface of the wall is known, it is only necessary to multiply this by the value 17.3 in order to obtain the total amount of heat in B.t.u. lost per hour. The

(Continued on page 443)

# Service Satisfactory to Customers*

## The essentials of good public relations

*Frank LeRoy Blanchard*

Director of Public Relations, Henry L. Doherty & Co.

WHEN we talk about service in the gas or any other public utility business, what do we mean? I have heard it defined as "something you do not have to do and are not paid for doing." My own definition of service is "any act voluntarily performed for the benefit of another."

Service is a product of business evolution. A hundred years ago it was unknown. Today it has become such an important factor in commercial practice that no public utility can be successful that withholds it from the customers. Its principal object is to win their good will and make them friends of the company. In these highly competitive days when the peanut politicians, the alleged reformers and the pestilential trouble-makers are doing everything they can to hamper and restrict public utilities through state and municipal legislation, we need all the friends we can get to protect our properties. Where else can we find them, if not among those with whom we come in daily contact—our customers?

### Gas Customers Form Vast Army

I wonder how many of you now assembled in this room have any idea of the vast army of people who use gas. According to figures furnished by the American Gas Association, the 966 gas companies, representing a capital investment of over $3,000,000,000, in the United States last year had 9,200,000 meters in operation. If we allow five persons to a meter, there are 46,000,000 people, a little less than half the population of the entire country, who depend upon you for their light and fuel. If all the gas companies were rendering service satisfactory to their customers, and if, in addition, they had their active co-operation and good will, what a mighty big help they would be when the industry is unjustly attacked, and what an insurance it would be for future prosperity?

If the financial success of our gas companies depends upon satisfactory service to customers, it is mighty important for us to know of what it consists. One thing is certain—no matter how perfect the service we render and no matter how hard we may try to make people happy, we shall never be able to satisfy everybody. The kicker and the chronic fault-finder will always be with us, and for this we ought to be thankful; we need them both, as they serve to keep us from being too well-satisfied with ourselves and our organization methods.

*An address delivered before Eastern States Gas Association, Philadelphia, April 10, 1924.

### Rates and Quality of Gas Most Important to Customers

We must admit at the very beginning of this discussion that the two things that interest our customers most are the rates charged and the quality of the gas furnished. If these are satisfactory, half the battle in our efforts to gain the confidence and good will of our public is won. It is not until we have established our status in respect to these two things that we are in a position to talk much about service.

The public judges a utility company according to the treatment it receives from its representatives. If they are courteous and show a desire to be accommodating and helpful to customers, the public will think well of the company. If, on the other hand, the employees are discourteous, if they fail to attend to their complaints and lie to them, the customers will resent the treatment they receive and become enemies of the company. It is the cashier, the complaint clerk, the meter readers and the collectors who come in frequent contact with customers who can make them friends of the company and not the president or general manager whom most of them never see.

### Willingness to Serve of Basic Importance

Willingness to serve is the fundamental principle upon which all satisfactory public utility service is based. If your executives and employees do not possess this desirable quality of character, how can you expect them properly to represent the company in their contact with customers? We may preach to them until the cows come home, we may issue bulletins and write letters to them, but it will do no good if they do not possess a willing spirit. Willingness to serve comes from the heart and not from the head. It is born of a sincere desire to help those who need assistance—to make people happier and better. Those who have it give kindly service voluntarily and without urging. What a fine thing it is that there are so many men and women in the gas industry who are animated by this spirit of helpfulness and willingness to serve!

One cold night last winter an excited woman called up the emergency office of the Consolidated Gas Company in New York and asked that a man be sent to her home at once to fix a service pipe that had sprung a leak and was causing much trouble. Two men, instead of one, were immediately sent by a fast automobile to the address given, where they found that a water pipe had burst and was flooding the place. Instead of telling the wo-

man that mending water pipes was not the work of gas company employees and that she should get a plumber if she could find one at that time of night, the workmen proceeded to stop the leak and helped her mop up the watery flood that covered the floor. The woman, of course, was deeply appreciative of the timely aid and thanked them most heartily.

"It's all right, lady," said one of them, as they were leaving the house. "You were certainly in trouble and we are glad to have helped you out."

Do you suppose that woman will ever forget the service the gas company men rendered her that night? No; that act made her a friend of the company for life.

### Courtesy a Second Essential

The second essential to service that will be satisfactory to customers is courtesy. You may have the best organized staff in the world, but if in their contact with customers they are brusque, indifferent, or discourteous, the company will fail to win the good will of the public. Your customers are entitled to considerate treatment when they call at the office to make a complaint, file a request or pay a bill. The clerks who wait upon them can seriously harm the company by disregarding the rules that should govern their conduct in their contact with the public.

The manager of a gas plant in an eastern city for a long time could not understand why the company was so bitterly hated by the public it served. As the rate charged for gas was reasonable, being lower than was charged in most other cities of similar size, and as he and his chief executives were active in the support of any movement designed to promote the interests of the municipality, he could see no reason for the hostility toward the company that was constantly in evidence.

But one day the manager happened to stand near the cage opening at the counter, behind which was located the complaint clerk, a middle-aged, sour-visaged man. Because of the character of the grill-work enclosing the top of the counter, the clerk did not know of his presence. Half a dozen people having complaints to make were in line, waiting their turn at the window. While the manager was looking at the group, a poorly-dressed woman turned away from the complaint clerk's window. Tears were trickling down her cheeks—the man behind the counter had said something that hurt her. The next in line was an elderly, pale-faced Jew, belonging to the garment-making class of workmen. In broken English he tried to tell the clerk what his complaint was, but the latter, after listening impatiently for a moment, suddenly exclaimed:

"Get to hell out of here and don't come back until you learn to talk so I can understand what you are belly-aching about."

The third person to approach the window was a middle-aged grocer, who complained of the insufficient quantity of gas supplied to light his store properly.

"Your pipes need blowing out. Why don't you blow 'em out yourself? You seem to have wind enough to do the job," growled the clerk. Some of those standing in line heard the remark and laughed at the grocer's discomfiture.

The manager was astonished and indignant at the treatment the company's customers received from the clerk. "Now I know why the company has the ill will of the public," he said to himself as he turned away.

### An Employee Who Made Enemies for the Gas Company

That clerk had for several years been making enemies instead of friends out of customers. Every man and woman who had been insulted or treated discourteously had told his or her friends about it, and they, in turn, repeated the story to others until in time the entire city had become inoculated with hatred and ill will toward the company.

The next day there was a new man behind the complaint counter. He had a friendly face and listened patiently to the customers who came to his desk. He was sympathetic and promised that their wants should be attended to right away, as indeed they were. It took many months to win back the confidence and good will of the public, but in the end courtesy and kindliness won out, and today no company is more highly esteemed by its customers.

This story emphasizes the importance of keeping close tab on the attitude maintained by all employees toward customers. When complaints of discourtesy are sent to the manager he should see that each one is promptly investigated, and if the truth of the customer's statements is established the offender should be made to apologize. If amicable relations between the company and the public are to be established and maintained, the company must do its part. Pigeon-holed complaints are unhealed sores and the longer they are neglected the harder they are to cure.

### Courtesy Should Be Maintained at All Events

It is sometimes difficult to be courteous to a customer who calls you a robber or charges you with dishonesty because he regards the bill you have rendered as excessive. But it won't do to lose your temper and turn the person out of your office. By submitting proof that will convince him he is wrong or unjust, you can, in most instances, convert an open enemy into a loyal friend.

The Public Service Company of Colorado last fall received a letter from a customer in which he called the company a robber and other uncomplimentary names because of the amount charged for electric light service furnished his town house. He said, in substance:

"I can furnish proof that you are robbers and that you are dishonest. My town house has been closed all summer because I and my family have occupied a bungalow back in the mountains, and therefore we could not have used the amount of electric current

(Continued on page 447)

# GAS MERCHANDISING

*Domestic – Industrial*

# How About It? Does Your Sales Force Create a Friendly Impression?

*Wm. H. Matlack*

IT IS said: "The first impression is the lasting one," and we are inclined to believe there is a great deal of truth in the statement.

The public service company is anxious, as we all know, to create favorable public opinion. These companies are advertising in the newspapers, magazines, by the use of direct mail, in street railway cars, on company trucks, billboards, by the use of slides, by store and window display and cards. All this advertising has as its objective the good will of the customer and the general public, and it is producing results.

Printed and painted advertising has been given the major amount of attention in the past. Now some of this energy is being directed to personal advertising. The service man, the clerk, the salesman are being sold and instructed in selling the customer good will, and while for a time the public relations department of some companies may have as some one has said, "got the cart before the horse," that is, advertised before they applied for assistance from within the organization. This condition has been corrected.

As we all know, the public service company is doing all in its power today to secure favorable public opinion, by rendering real service and telling folks about it with printer's ink and by performance.

### Loss of Good Will

An investigation conducted by the research department of a large merchandising organization indicates the following reasons for folks swinging their patronage from one store to another:

Thirty-six and five-tenths per cent because sales people were indifferent, insolent or ignorant of the merchandise; 20.5 per cent because attempts were made to substitute, because errors were made or tricky methods employed. The other 43 per cent of changes were for various reasons, such as over-insistance of sales people, slow deliveries, etc.

### How One Gas Company Paves the Way

The Illinois Power & Light Corporation is of the opinion that, in the majority of cases, where the customer is accorded courteous treatment at the time of making application for service, a friendly relation will be created which can and should exist for all time; accordingly, they make it a point to "get the customer started right." One of the bulletins issued by the company looking to this end is as follows:

"To All Employees:

"Until further notice, kindly use the following form when taking applications for gas meter:

"What address, please?

"Are you using gas at present time? (Is so) What address, please? (If not) Did you ever use gas in East St. Louis? (If so) What address, please?

"Fill in application.

"Ask customer to please sign application.

"Note: If application is made by wife, please ask applicant to sign husband's name and then her own name.

"Insert name on order (print if possible).

"Note: Name should be taken from signature, always show first name in full, as: Wm. Jas. Walter, John. Do not ask customer to

sign name in full. If contract is signed J. Doe, ask the applicant to please advise you whether "J" is for John, or Jas., etc. This information has been very profitable to the credit department.

"In order to complete our files it will be necessary for me to ask you a few questions, such as:

"What is your occupation, please? or (if wife is applying) "What is your husband's occupation, please?

"What is the name of your employer?

"What is your landlord's name, please?

"Note: If applicant is the owner, he or she will advise you immediately. If applicant is renting, write landlord's name on the first line under credit information and kindly ask the customer to make the necessary deposit. Deposit for domestic use is $5.00. For business places the deposit will be estimated.

"Have you a range and water heater?

"Are your appliances connected, or do you want our men to connect them for you?

"Thank you."

Good will, in the final analysis, is nothing more than a realization on the part of the public that it can expect efficient, courteous service from an organization with whom it deals. Good will is a large asset to any organization, and is the child of but one thing—SERVICE.

# Big Business Awaiting Appliance Dealers Who Go After It

*O. Foerster Schully*

It is doubtless true that gas appliance dealers, as a whole, do not go after business as energetically as might be desired. Whatever business walks into their establishment they generally handle efficiently enough to get the greater part of sales due them.

But how about the prospects who never put foot into the gas appliance office or show rooms until fairly dragged there? There are worlds of these people nestling in their homes and offices who, if given the proper incentive and inducement, will boost up the black figures on the ledger.

### A Sales Letter with a Punch Back of It

The "go-get-itive" policy of the New Orleans Gas Light Company was recently demonstrated in a sales letter which it mailed to its list of patrons in the Crescent City. The multigraphing on the company's letter-head was so effectively done that it practically defied detection from typewriting. It was addressed to the woman of the house in all instances and the typing of the address perfectly matched the multigraph work below. The letter was as follows:

"Dear Madam: It is a satisfaction for us to know that you are using a gas range in your home and that your family is enjoying the advantages and economies of cooking with gas. But are you using a gas water heater and benefiting by some of its comforts?

"A gas water heater solves the problems of household hot water and solves it completely and economically, because it furnishes all the hot water desired at any hour of the day or night and yet consumes gas only when the hot water is needed.

"With a gas water heater in your kitchen you are independent of your gas range and free from all anxiety over any sudden demand for hot water. This appliance, installed in your kitchen and occupying scarcely any space, is so constructed that the heat from its burners goes into the water and not into the room, thus insuring ample hot water and a cool kitchen.

"Please bear in mind that a gas water heater costs little to use, because it burns gas only when the water is being heated.

"Our representative will be glad to call to talk the matter over with you, or we will welcome you to our salesroom.

"Sold on our easy payment plan.

"Very truly yours,

"NEW ORLEANS GAS LIGHT COMPANY."

The letter brought unusually big returns. This is merely another piece of evidence that business is waiting for the appliance dealer who goes after it. But he must go after it.

## "COOK" THREE-FOURTHS OF METAL USED FOR AUTOS IN U. S. BY GAS FUEL

According to a recent survey of industrial gas uses, it was found that three-fourths of all heat treatment of metals used in the automobile industry is done with gas, while one manufacturer of automobile accessories uses seven million cubic feet a month. One car and foundry company consumes fifteen million feet a month; one glass company, thirty-three million feet; one biscuit company, two million feet; one can company, five million feet; one group of packers, twenty million feet. The saving of storage space for coal, the cleanliness and the accurate regulation of heat, have all contributed to the increasing use of gas as industrial fuel, and it is estimated that by 1930 more than 90 per cent of the output of the country will be used for this purpose and for domestic cooking and heating, with less than 10 per cent used for lighting, a complete reversal of the distribution of gas at the advent of the electric light.

# Your Customer Approach and How to Strengthen It

*Lester G. Herbert*

Customer approach is important, for in a space of time, often as short as the twinkling of an eye, the prospect is attracted or irritated in a manner impossible to describe. First impressions really are lasting—so be very careful of them. Happily there are a few common sense principles which will go a long way to make the customer approach successful.

First of all, remember that the customer is human and that regardless of surface appearances he reacts almost exactly as you and I would under similar circumstances. The timid, the aggressive, the rich, the poor—all respond to sincerity, courtesy, interest, promptness and that indescribable something which savors of deference without being in the least servile.

### Speak First

Look the customer straight in the eye without an offensive stare and speak. Say something. Don't walk forward expectantly and take it for granted that the other person will find it easy to speak first. More people than you realize are at a loss for words in beginning a conversation. That's why they remark about the weather or ask about your health, often not waiting for a reply.

The words you speak should not be stupid, as "Did you want something?" That is sure to arouse the feeling—"What do you suppose I am here for, any way?"

Say, rather, "Good morning," or "What can I do for you?" or "Let me show you what you are most interested in—no trouble at all!"

A smile is not necessarily a broad grin. A smiling face and a smiling voice are a pleasant face and voice. Avoid anything likely in the least to make the prospect uncomfortable. One salesman couldn't understand why he seemed to drive people away—often with signs of anger or mortification on their faces.

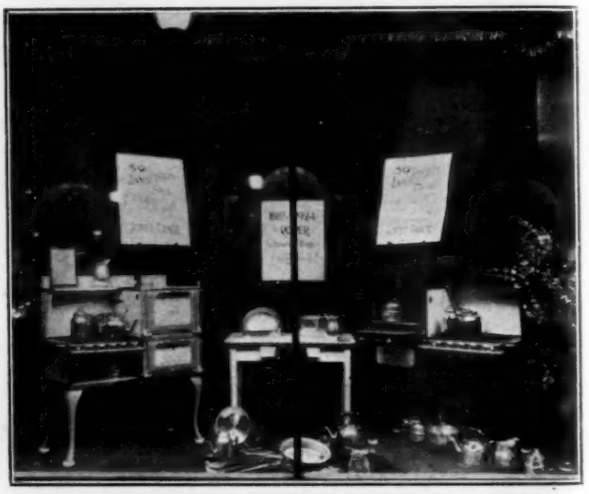
At last a pert lad gave him the tip. "Gee, whitticker, Cap," the boy burst out, "I hope you like my looks—the way I wear my hair and my clothes and the style of my shoes. How does the inventory tally up, eh? They're as good as I can afford!"

### The Rudeness of an Appraising Glance

The salesman had never realized the rudeness of his appraising glance—and he was a big enough man to correct his weak and offensive approach. All of us go, from time to time, to buy things of other people. We need necessities and luxuries. Let us use each and every such occasion to study what pleases or offends. We will not do this for the purpose of criticism, of any one except ourselves. And let us remember that criticism can be favorable as well as adverse.

But what will really count in such cases is to study what we have observed, alongside our own methods. We must be honest enough to acknowledge where we are inclined to limp, and to go about correcting our faults earnestly. It is a fine plan to reduce the correction to a definite, brief and positive suggestion, and to write that sentence on a card and put it where we will see it many times a day. If we have several suggestions—all the better. But do not lose track of them.

Keep in mind the vital character of the approach and learn to win from the first minute. Learn how to judge types so as to approach accordingly and then experience the joy of being able in large measure to govern the situation.



**Window Display of Sioux City Gas and Electric Company**

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### GAS THE UNIVERSAL KITCHEN FUEL

An ordinary top burner of a gas range uses 24 cubic feet of manufactured gas an hour, which is equivalent in heat value to one pound of anthracite coal. The average kitchen stove couldn't even be started with one pound of anthracite coal, not to mention wood, paper and patience required, and then soot, smoke and ashes afterwards. This, in a nutshell, is why gas is the universal kitchen fuel.

# INDUSTRIAL GAS LESSONS

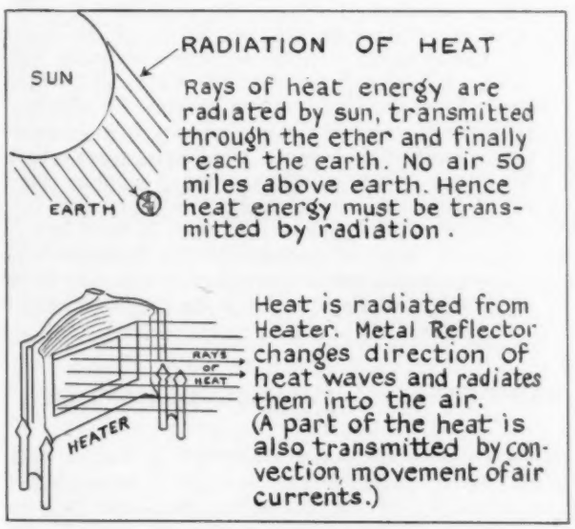
IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

# Lesson No. 19

## Radiation of Heat

### Transmission of Heat by Radiation

The third method of transmitting heat is by radiation. This is probably the most difficult of all heat phenomena to understand, but it shows definitely that heat is not a substance or a tangible material, but simply a form of energy, for it is only energy that can be transmitted from place to place by radiation. The difficulty in understanding radiation of heat is that it is ordinarily confounded with conduction and convection. Thus, if the hand is held directly over a hot stove, a certain amount of heat will strike the hand and this heat will be transmitted from the hot stove, not only by the movement of the heated air currents, in other words, by convection, but also by radiation.


RADIATION OF HEAT
SUN
Rays of heat energy are radiated by sun, transmitted through the ether and finally reach the earth. No air 50 miles above earth. Hence heat energy must be transmitted by radiation.
EARTH
RAYS OF HEAT
HEATER
Heat is radiated from Heater. Metal Reflector changes direction of heat waves and radiates them into the air. (A part of the heat is also transmitted by convection, movement of air currents.)

On the other hand, the heat of the sun is transmitted to the earth by radiation. There is no air current available to carry the sun's heat to the earth, but it is transmitted through the ether, just like radio signals and the voice are carried through the ether in radio telephony and telegraphy. What is being carried from place to place is not material substance, but a form of energy.

### Analogy Between Heat and Light

Radiant heat is much like radiant light. In fact, it is hard to separate the two. They are both forms of energy which are transmitted through the ether in the form of wave motion. The rapidity of the movement of heat and light waves through the ether is the same, that is, approximately 186,000 miles per second. This is known to be the maximum velocity that is and can be obtained in nature. The analogy between heat and light waves or rays may be carried still farther, and, in fact, the transmission of heat by radiation will be best understood if it is remembered that heat is radiated in the same manner as light. It is also a fact that both light and heat rays can be reflected from or refracted through substances.

### Reflection of Heat

Thus, a mirror will reflect light rays. That is, a beam of light may be made to strike the mirror and be directed in one way or the other by placing the latter in the proper position with respect to the direction of the light. Long distance signalling in military science is carried out by means of the reflection of the sun's rays from a set of mirrors, which is one practical application of this property of light.

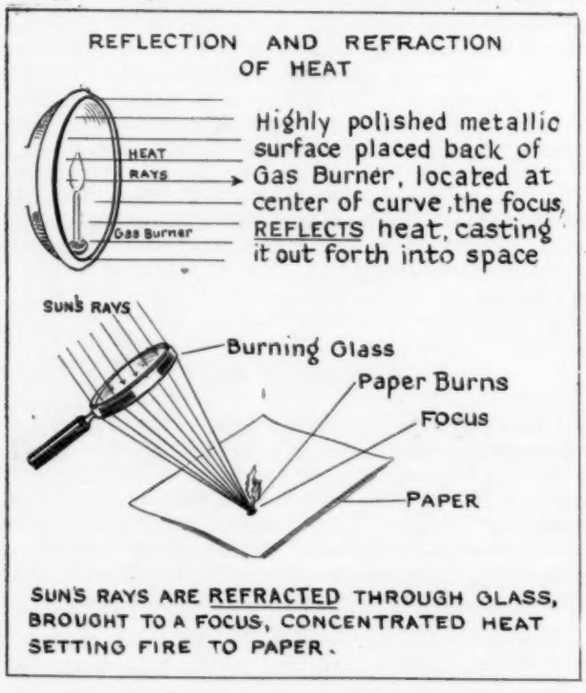
Heat rays can be reflected in the same manner. It is known that a brightly polished surface will reflect heat that is being transmitted through the air by radiation. The best example of this is the heaters that are built much like searchlights. The heating element is located in the focus of the concave mirror, as the source of light would be located in the searchlight. The rays of heat strike up against the polished metallic surface of the concave mirror and are thrown out into the air. In this case the heat is transmitted from the heated body into the room by radiation, and the mirror aids in disseminating the heat throughout the room.

The mere experience of standing in front of one of these heaters will convince the observer that heat waves are striking him and that heat is being radiated in unquestionable manner. Of course, there will always be a certain amount of convection due to the heat setting in motion particles of air that have

become heated. But it must always be remembered that this mode of transmitting heat is entirely different from the radiation of heat. The radiation of heat does not involve the movement of any particles of matter. It is simply concerned with the heat waves, waves of energy, of heat energy, similar to waves of light energy, that are transmitted through the ether.

### Difference Between Convection and Radiation

In simple words, convection of heat involves the movement of particles of matter and incidentally the heat which that matter may contain. Radiation, like conduction, involves merely the movement of heat energy; the particles of matter remain stationary. In the conduction of heat, the heat energy is moved from one particle of matter—whether it is a solid, liquid or gas—to the next, and the movement of the energy is dependent on the characteristic capacity


REFLECTION AND REFRACTION OF HEAT
HEAT RAYS
Gas Burner
Highly polished metallic surface placed back of Gas Burner, located at center of curve, the focus, REFLECTS heat, casting it out forth into space
SUN'S RAYS
Burning Glass
Paper Burns
Focus
PAPER
SUN'S RAYS ARE REFRACTED THROUGH GLASS, BROUGHT TO A FOCUS, CONCENTRATED HEAT SETTING FIRE TO PAPER.

of the substance for allowing the heat energy to pass through its structure. It is entirely analagous to the capacity of substances for conducting electricity. Some are good conductors and others are poor conductors. In the case of radiation, however, the heat energy is transmitted by wave motions that are set up in the ether, not in the air.

### Refraction of Heat

Another property of heat waves, which is also exhibited by light rays, is refraction of the rays through substances. Crystals and glass refract light. That is, they allow light to pass through their substance and emerge changed in some way. Thus a crystal of Iceland spar will divide a single beam of light into two refracted beams. Prisms will decompose light into its constituent parts, the colors of the rainbow, that is, the simple colored light rays. That heat rays will be refracted and changed in some way is best illustrated by the use of the burning glass. The burning glass, which is an ordinary convex magnifying glass, causes the parallel rays of heat, emanating from the sun, to come to a focus. The heat is concentrated at that point, and if an inflammable object is held at the focus it may be made to catch fire and burn.

## CYANIDES FROM SPENT OXIDE A NEW METHOD

Broadly speaking, the systems used in extracting cyanides from spent oxides fall into two distinct groups, namely, those in which the free sulphur is first extracted by means of a solvent and those in which the oxide is straightway treated for the recovery of the cyanogen. The latter processes are chiefly in use, and consist, in the main, of the lixiviation of the material for the removal of soluble salts, such as ammonium compounds and sulphocyanides, the whole of the cyanogen being finally recovered as potassium ferrocyanide.

Recently a method which appears to strike out on a somewhat new line has been introduced in Germany, the object being the recovery of both sulphur and cyanogen compounds while leaving the oxide in a condition which permits of its re-use for absorption purposes. The process consists in treating the spent material with a hot solution of the sulphides or polysulphides of alkaline earths, the polysulphide liquor formed being subsequently decomposed with sulphurous acid. In this way a mixture is obtained which consists of sulphur and the sulphites of alkaline earths, while the cyanide compounds remain in solution in the form of their earth-alkali salts from which they may be worked up. Separation of sulphur from sulphite follows by treatment with acid, and sulphurous acid is formed which in turn is used in the process. The method is not without interest, and from figures which the inventors give it would seem that it shows no little promise from the commercial point of view.—(Chemical Age of London).

## COMPENSATION SUPERSEDES DAMAGE SUITS

It seems hard for some attorneys to realize that the purpose of compensation laws is to take claims for injuries out of the hands of juries and courts, so far as the determination of the amounts to be awarded is concerned. The Appellate Division of the Supreme Court of New York, 201 N. Y. Supp. 874, says that where a state workmen's compensation law is in force it becomes a part of the contract of hiring, and that employees seeking compensation for losses due to injuries incurred in the course of the employment must file their claims under the provisions of that law, instead of seeking to recover damages for the accident or other injury by means of a damage suit. And, the court adds, this rule applies to minors as well as to adults.

# As The Journal Views It

## THE GAS HOLDER

Every now and then the daily newspapers contain news items regarding objections that are raised in various localities and communities to the erection of gas holders. Probably of all the paraphernalia of the gas industry the holder is the one that excites the most adverse comment on the part of the residents of communities who dwell near locations where holders are erected or whose construction is proposed.

It is very strange that these people, who are so strongly opposed to the erection of gas holders in their neighborhood, should lose sight of the real facts in the matter. The gas company does not erect the holder because it has a fetich for doing so, and it does not put the holder in one locality, or the other, just for the purpose of aggravating the people who live therein, and perhaps impairing the aesthetic aspect of the local scenery. It puts up a holder simply because it has to do so in order to be able to serve the very people who object to it.

Gas cannot be distributed to customers without holders, and when the gas company meets with objection to the erection of holders it must bring forcibly to the minds of the objectors the simple fact that the holder is being constructed for their particular benefit, and not because the gas company particularly likes to do so. Of course, the company wants to give proper service to its customers. It must protect the supply of gas so that it will always be available when the gas valve is opened, whether it be on the kitchen range or the industrial furnace. It must impress upon its customers that holders are erected in certain localities for purely technical reasons.

It is unfortunate that there should be such opposition and that the gas company should be brought into the limelight as a soulless corporation that has no sense of the beauty of things and is erecting ugly structures like holders with the idea of spoiling scenery, etc. It would be well that in cases where news items appear of the above character that the gas company present the real facts to the newspapers so that they may correct false impressions that might be given by various community organizations and societies that make it their business to oppose every step of progress that the gas company and other utility companies make, in spite of the fact that these undertakings are for the express benefit of the very chronic kickers and trouble makers.

In the last case that has come to our attention regarding objection to the erection of a holder, it was reported in the newspaper that the Civic League in the neighborhood where the holder is going to be erected had engaged counsel to procure an injunction to prevent its construction. It was also pointed out that the holder would act as a detriment to the health of the residents of the district. Just how this conclusion was arrived at is hard to tell, for there is no possible way in which such a result could ensue from the mere fact that a holder is found in a certain locality.

However, the lesson that can be learned from this situation is simply this, that the gas company has to be on its toes all the time fighting for its rights, as it does not pay to remain silent when such attacks are made against it. The whole situation is so ridiculous on the face of it that it is just like having to tell a man to get out of the rain because he will get wet. The holder is erected for the benefit of the gas customers and they themselves are the ones that object to it. And if, for lack of proper holder capacity, they were unable to get gas, they would be the first to complain that the company was not treating them fairly.

It is our opinion that, once the gas customer really learns why the holder is erected, and how it benefits him, such objections will cease. It is not so much that the opposition itself is serious, or that the matter is one of vital importance and requires special attention, but simply that such propaganda against holder erection gives people the idea that gas companies are not desirable members of a community; that their interests are not the interests of the people who live in the community. The gas company should always strive to correct this impression, whenever it finds out that such has been instilled in the community by holder erection opposition and other similar unwarranted concentrated action on the part of community organizations.

# GAS WRINKLES

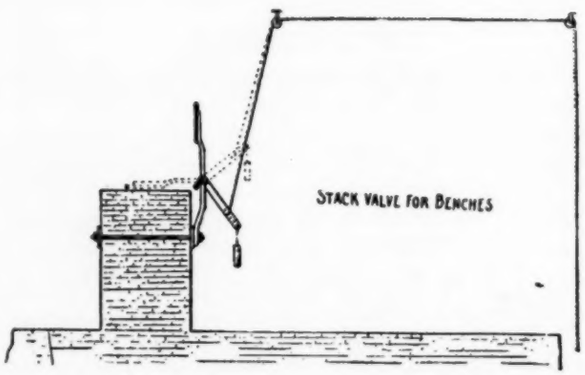
## Stack Valve for Bench Chimneys

*Arthur Finnegan*

A CONSIDERABLE cooling effect is made on benches during the time their furnaces are being filled or clinkered, by the cold air rushing through the heated passages and flues and out the chimneys. To prevent this the "stack valve," shown in the sketch, was arranged. The "valve" is simply a plate of quarter-inch sheet iron, for although a fire brick tile had been thought of, it was decided to use the lighter cover as being equally safe, because when down there would be no current past it, and it would be away from the heat when not in use.

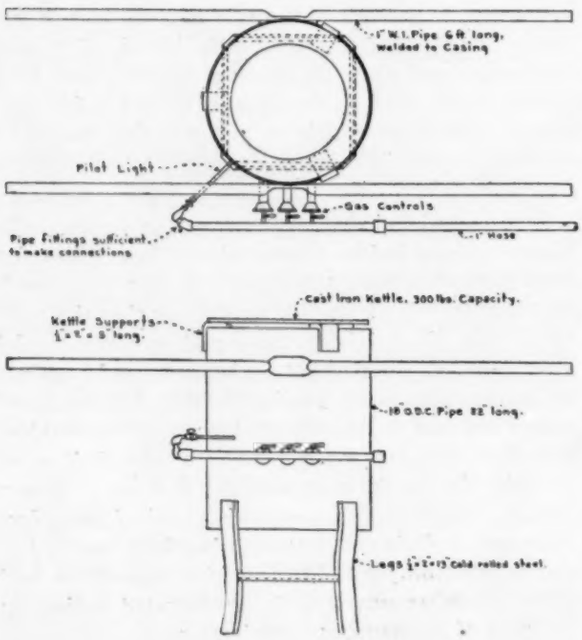
Two plates are used for each bench, riveted to pieces of iron, which are attached to a piece of three-quarter inch pipe by set screws. One plate is set opposite each upstake flue. The lever and weight may be fastened at any point on the bar, so that it is easy to place them below a roof truss and use that for holding the pulleys. A long lever may be used instead of the pulleys, if wanted.

The stack valve is made so as to stay open of itself, but can be kept closed by hooking the wire cord below or hanging a weight on the lower end.




### Gas Fired Melting Pot

GAS FIRED LEAD MELTING POT.
For use with Cast Iron Pipe Construction.




### PORTABLE MAP OF DISTRIBUTION MAINS

A very convenient scheme for a portable map of distribution mains is described as follows:

A map of the city is drawn to the scale desired, and white prints made from a Van Dyke, showing the streets as narrow lines. The mains are shown by drawing colored pencil lines directly on the street lines, different colors being used for the different sizes of mains. This map has the smallest possible number of lines, and so can be drawn to a small scale.

The map is then mounted on a piece of composition board with thumb tacks. The surface of the map is protected by a piece of transparent celluloid, such as is used in automobile tops. The celluloid is fastened to the board with the same thumb tacks as the map. Whenever it is desired to alter the map or bring it up to date, the celluloid is easily removed and replaced. Such a map, which can be carried about, handled and marked upon without injury, is very convenient. A map of this kind on a scale of 1,200 feet to the inch, with dimensions of 36x48 inches has proved very valuable as a working map.

### METHOD OF CLEANING REGULATOR PARTS

**Thomas E. Boyd, Denver, Colorado**

Regulators and parts are cleaned by placing in a wire frame and lowering into a gas heated vat of caustic solution and boiled. This removes all traces of tar and gums and a saving in time over the old method of scraping.

# Catechism of Central Station Gas Engineering in the United States

## Installment No. 19

(Continued from last week)

### Heating Up the Carburetter and Superheater

The superheater having been successfully lighted, the blasting is continued until the carbureter and superheater are heated up to nearly the right temperature for gas making, the blast being so adjusted that all the combustible portion of the blast gas is consumed without having any excess of air on the superheater, and the generator being coaled when necessary. The total time required to bring the apparatus to this point after the blast is first turned on will be from 1½ to 2 hours. When it is reached the blast should be shut off, the generator filled with coal and the blasting resumed for from five to ten minutes more, to get the heats to the gas-making point.

### Admitting the Oil

When this is reached the blast valves are shut, beginning at the superheater and finishing at the generator, the steam is turned on, the stack valve closed, and, finally, the oil pump started and the oil admitted to the carbureter. Before turning on the oil for this first run the pressure gauges should be looked at to see if the proper pressure is shown, and so make certain that everything is tight and that there are no large leaks that need to be stopped before gas making can be carried on. During the run the rate at which the oil is being fed into the apparatus must be watched and so regulated that the desired quantity is used. One minute before the end of the run the oil should be shut off in order to avoid loss of oil gas when the run is taken off. At the end of the time allowed for the run the steam is shut off, the stack valve opened, the blast turned on the generator, carbureter and superheater, in the order named, and the apparatus is heated up for another run.

### Operation of Carburetted Water Gas Apparatus of Generator-Superheater Type

99. Describe the operation of a carbureted water-gas apparatus of the generator-superheater type during its regular working, including in the description an account of how to handle the various blast valves so as to bring the different parts of the apparatus to the proper temperatures simultaneously and without any waste of fuel.

Ans. In the normal operation of a carbureted water-gas apparatus the work is usually arranged so that the fire is cleaned early in the working day, and the description of the method of operation will be begun with this cleaning.

### Details of Operation

After the last run is taken off, the apparatus should be blown through with only the generator blast valve open for, say, 20 seconds, to free the space below the fire from any water gas, the blast valve should be closed, leaving the stack valve open, the blower shut down, unless two sets are being worked in conjunction, an examination made to see that all steam is turned off from the set, and then the ash pit and stoke hole doors should be opened and the plugs removed. Working through the stoke holes with the proper tools (hooks and hoes) all the ashes and soft clinker should be loosened up and removed from around the outside of the fire, leaving the center undisturbed until the work around the sides has been completed. After cleaning out all the clinker that is sufficiently loose and soft to be worked out with the hooks, as much of the hard clinker as possible should be cut away from the walls with chisel bars, with a slight bend to enable them to reach the proper points, the lumps cut off being removed from the grate with the hooks. It may be necessary to use a sledge on the bars to loosen the clinker if it is very hard, care being taken not to knock down the fire. When all that can be done around the outside without dropping the fire has been done, the ashes and clinker should be cleaned out from the center and the fire dropped on the grate in a solid mass, no large spaces being left unfilled. The center of the fire is left until the last because, as a rule, the clinker here is softest and the fire is apt to drop and interfere with the work as soon as this portion is disturbed, while it will hold up much better on the sides, and even if it should happen to come down there before the center is cleaned the soft clinker can be broken up with chisel bars and all the ashes raked out by working between the grate bars with a long hook. The bottom cleaning having been completed and the ashes removed from the ash pit, the ash pit and stoke-hole doors should be closed tight, the charging door opened an the fire barred down from the top to cut off from the side of the generator any clinker situated too high up to be reached from the bottom with the bent bars. This barring down is done wih long chisel bars of different sizes, varying from light ones, which can be handled by one man, for use when the clinker is soft, to heavy ones for hard clinker which require three or four men to work them. If the clinker is very hard it may be necessary to drive the bars with sledges until the holes so made have weakened the clinker sufficiently to allow of its being broken down by the hand bars. In all work with bars care must be taken to keep the bars away from the brickwork, two or three inches of clinker being left on the face of the bricks as a protection against wear and tear. The length of time required for cleaning will vary ac-

cording to the condition of the fire, but will not usually be more than an hour.

### The Blasting and Heating

The cleaning having been finished, the generator should be filled with fuel and the full blast turned on. It will probably be necessary to make several blows and runs before the fire becomes heated through and during these blows the generator blast valve must be kept full open. But when the fire is in good shape the valves on the different parts of the apparatus should be so adjusted as to bring all to the proper temperature simultaneously and without any waste of fuel. The adjustment required for the accomplishment of this object will vary with the condition of the fire and the character of the generator fuel and carbureting material used, and the conditions must be studied for each case. The goal to be worked for is the bringing of the generator up to heat without making any more producer gas than is required to raise the checker work in the carbureter and superheater to the proper temperature for the gasification of the oil. The smaller the amount of combustible gas formed in the generator during the blow the smaller will be the amount of fuel used per 1,000 cu. ft. of gas made, and, therefore, no greater quantity of such gas should be produced than is needed for the heating of the carbureter and superheater. In one case it may be found that the most economical fuel results are obtained when the generator blast valve is not fully opened, in others it may be necessary to have it opened wide. Experiments must be tried with each set of apparatus to determine just how the valves shall be handled so as to avoid, as far as possible, the escape of unconsumed carbon monoxide, as shown by the presence of a blue flame at the superheater stack, and have all parts of the apparatus heated up within the usual time allowed for a blow, say 6 to 7 minutes. When the apparatus is properly heated the same adjustment of valves will give the desired result for each blow as long as the amount of carbureting material used per 1,000 cu. ft. and the amount of gas made per run are not varied to any great extent.

As the operation of putting on and taking off a run was described in the answer to question No. 98, it is not necessary to repeat it here. After every four or five runs fresh fuel should be put in the generator to keep the height of the fire as nearly uniform as possible.

## Double Superheater Lowe Carburetted Water Gas Apparatus

100. Give a description, illustrated with a sketch showing a vertical section of the apparatus, of the construction of a double superheater Lowe carbureted water-gas apparatus, and give a brief description of its operation for the manufacture of carbureted water gas.

Ans. As is shown on the cut in Question 93 (Page 395, American Gas Journal, April 26, 1924) the double superheater Lowe carbureted water-gas apparatus is composed of three cylindrical vessels connected together in sequence. The shells of these vessels are made of wrought iron and they are lined with fire clay blocks. An annular space from 1 in. to 1½ in. wide is left between the lining and the iron shell, and is filled with asbestos fibre or other fireproof non-conducting material, to diminish the radiation of heat from the shell.

The first vessel, A, is called the generator; the second, B, the carbureter or first superheater, and the third, C, the superheater, main superheater or fixing chamber.

The generator contains the fuel for heating up the apparatus and producing the water gas, and is provided with a grate and cleaning and clinkering doors at the grate level, and a charging door or doors on the top. It is usually connected from both the top and bottom to the top of the carbureter.

The carbureter is filled with a checker work of fire brick on edge, set with from 1½ in. to 2 in. clear space between the rows, and so that the rows break joint with each other. It is connected at the bottom to the superheater or fixing chamber, which is also filled with checker brick. On the top of the superheater is a take-off casting, the top of which opens to the atmosphere and the side to a pipe leading to a small cylindrical vessel called the wash-box, which contains water in which the open end of the take-off pipe is sealed. The opening to the atmosphere can be closed by lowering a heavy iron lid called the stack valve, which by its own weight forms a gas-tight joint with the face of the casting. When this lid is lowered the only outlet from the superheater is through the take-off pipe and the wash-box.

The generator has suitable air blast and steam connections, the carbureter air blast and oil connections, and the superheater air blast connections as shown on the cut. The operation of the apparatus is as follows:

### Operation of Apparatus

A fire is started in the generator A, and this vessel is filled with coke which is brought to a high temperature by the air blast. Owing to the depth of the fuel bed and the comparatively limited amount of air admitted to the generator, the combustion of the fuel is not perfect and the products of combustion passing off through the carbureter to the superheater contain carbon monoxide. By blowing air into the carbureter and superheater this carbon monoxide is consumed in these vessels and the checker work, with which they are filled, is highly heated. The products of the final perfect combustion so obtained pass off through the open stack valve to the stack and the atmosphere. This blowing up is continued until all parts of the apparatus have been brought to the proper temperature. The

blast is then shut off and the stack valve closed. Steam is admitted through the steam pipe to either the top or the bottom of the generator, as the case may be, and passing through the fuel bed is decomposed by the hot carbon, its oxygen uniting with the carbon to form carbon monoxide, while the hydrogen is set free. The mixture of hydrogen and carbon monoxide, called water gas, passes over into the carbureter through the top of which oil is admitted. The oil being vaporized by the heat, the vapors are picked up by the water gas and pass forward with it over the hot checker brick in the carbureter and superheater. The long continued exposure to heat converts the oil vapors into permanent oil gas, this oil gas being mixed, during its formation, with the water gas, and the result is an illuminating gas, which, properly speaking, should be called carbureted water-gas, but is commonly known as water gas. The stack valve being closed, this gas passes out of the superheater by way of the take-off pipe and wash-box, from which it goes to the scrubber and the rest of the apparatus.

The decomposition of the steam absorbs heat from the fuel in the generator and the distillation of the oil takes up heat from the checker brick in the carbureter and superheater, so the apparatus gradually cools down during the periods of gas making. When it has been cooled to a temperature at which gas cannot be economically produced, the oil and steam are shut off, the stack valve opened, the blast turned on and the heating up process repeated. The operation thus consists of a series of alternating periods of heating up called "blows," and periods of making gas called "runs."

### Depth of Bed and Quantity of Air Blast in Their Relation to Character of Fuel

101. In a water-gas apparatus, of the Lowe type, what influence does the character of the fuel used have upon the depth of fire and the amount of air blown into the generator?

Ans. A porous fuel, such as coke, requires a deeper fuel bed than a dense fuel, such as anthracite. The amount of air blown into the generator will be practically the same per pound of combustible used, whether the fuel were coke or anthracite. The amount of air per pound of combustible would vary with the amount of hydrogen in the fuel. Ignoring the hydrogen, which is present in very small proportions in coke and anthracite, the amount of air blown into the generator would be the same per pound of combustible, whether coke or anthracite, if the conversion of the oxygen of the air into carbon dioxide and into carbon monoxide, and the escape of uncombined oxygen, from the top of the fuel bed, were in the same proportion.

### Comparison of Coke and Anthracite Coal as Generator Fuels

102. It is found by test at a certain gas works that when using anthracite coal in the generator of the carburetted water-gas apparatus the generator fuel amounts to 34 pounds per 1,000 cubic feet of carburetted gas made and the rate of make is 13,000 cubic feet per hour; while when a certain furnace coke is used the generator fuel amounts to 37 pounds per 1,000 cubic feet and the rate of make is only 9,000 cubic feet per hour. The price of coal is $4.90 per gross ton and the wages of the gas maker are 20 cents per hour. What would be the equivalent price per gross ton of the coke, all items affecting the cost of the gas which are not mentioned above being considered equal in the two cases?

Ans. Since, as stated in the question, the items of generator fuel and gas maker's labor are the only ones to be considered, the price of coke equivalent to a price of $4.90 per gross ton for anthracite coal must be such that the total cost of gas maker's labor and generator fuel per 1,000 cubic feet of gas made will be the same in each case.

In the case of the coal, under the conditions stated in the question, 34 pounds costing $490/2240 = 0.219$ cent per pound, are required for generator fuel per 1,000 cubic feet of gas made, so the cost of this fuel will be $34 \times 0.219 = 7.45$ cents per 1,000 cubic feet. The cost of gas maker's labor is 20 cents per 13,000 cubic feet, or $20/13 = 1.54$ cents per 1,000 cubic feet. The total cost for generator fuel and gas maker's labor is therefore 8.99 cents per 1,000 cubic feet.

When using coke the gas maker's labor will cost 20 cents per 9,000 cubic feet, or 2.22 cents per 1,000 cubic feet. The price at which coke must be bought to be equivalent to coal at $4.90 per ton is therefore $8.99 - 2.22 = 6.77$ cents for the amount, 37 pounds, required as generator fuel per 1,000 cubic feet of gas made. This is equal to a price per pound of $6.77/37 = 0.183$ cent. or a price per gross ton of $4.10.

### Temperature of Checker Bricks in Carburetter and Superheater

103. When using gas oil as the carbureting material in a double superheater carbureted water-gas apparatus, should the checker bricks be kept at the same temperature in both the carbureter and superheater? If not, in which vessel should the highest heat be carried? Give the reasons for your answer.

Ans. Under ordinary conditions, the best oil efficiencies are obtained by carrying the checker bricks in the carbureter at a higher heat than those in the superheater.

The reason for this is that a high initial heat seems to be required for evaporating the oil and breaking it up into permanent gases, while these gases, after their formation, should pass as soon as possible into a somewhat lower temperature, since the heavy hydrocarbons or illuminants will be deteriorated by further breaking down if they are subjected to too long an exposure to the high temperatures at which the oil is best broken up.

### Making Oil Gas Directly With Water Gas

104. In the manufacture of carbureted water-gas it is customary to have the water gas pick up the oil in a state of vapor, at the entrance to the fixing vessels and carry this vapor and the resulting gas

through these vessels, the oil gas being thus made in the presence of the water gas. What advantages has this method over that of making the oil gas entirely separate from the water gas?

Ans. The principal advantage that is thought to be obtained by carrying on the manufacture of carbureted water-gas so that the oil gas portion is made in the presence of the water gas instead of being made entirely separate from the water gas, is that the presence of the water gas shields the oil gas from the heat and renders it less subject to over-decomposition in case the temperature of the heated surfaces is too high or the exposure to the heat too prolonged. The effect upon the oil vapors and gas of exposure to heat of too great intensity or for too long a time is to produce either hydrocarbon gases of low illuminating values, or hydrocarbon vapors which, although they are of high illuminating value, can be carried by the gas only to a limited extent. By separating and surrounding the molecules of the oil vapors and gas, the water gas reduces the extent to which they are exposed to the heat and so reduces the liability to over-decomposition.

### Effect of Water Gas on Gasification of Oil

On the other hand, it is possible that an excess of water gas will exert so great an effect as to interfere with the complete gasification of the oil, and in cases where the amount of exposure is small or the intensity of the heat low, the presence of water gas during the decomposition of the oil may be detrimental. This, however, will not occur in an apparatus that is properly designed and handled.

Another advantage of making the oil gas in the presence of the water gas is that the latter will pick up and carry oil vapors that escape gasification, and, if the water gas were not present, would be condensed and left behind when the oil gas was cooled. These vapors are of value as illuminants, and so the candle power of the carbureted water-gas made in this way will be higher for an equal amount of oil used than will be that of carbureted water-gas made by making the water gas and oil gas separately and mixing them cold. This advantage can, however, be obtained to a great extent even when the two gases are made separately by mixing them hot.

This method of making carbureted water-gas also makes it possible to conveniently arrange the apparatus so that the heat required for the gasification of the oil can be furnished very economically by the combustion, and partly by the sensible heat, of the producer gas formed in the generator while the fuel is being heated up to the temperature required for the manufacture of water gas.

### Advantages of Heating Oil

105. What are the advantages derived from heating the oil used in a carbureted water-gas apparatus before it is admitted to the carbureter?

Ans. The advantages derived from heating the oil used in a carbureted water-gas apparatus before it is admitted to the carbureter are a saving in coal, if the oil is heated by heat that would otherwise be wasted, and an increased efficiency in the use of oil.

All the oil run into the carbureter must be raised from the temperature at which it enters, to that existing in the carbureter, by means of heat supplied from the checker-brick, after having been received by them from the blast gases during the preceding blow. The lower the temperature at which the oil enters, the greater the quantity of heat that must be given out by and supplied to the checker-brick, and, therefore, the greater the quantity of combustible blast gases required to be produced and the greater the consumption of coal in the generator. Any heating of the oil before it enters the carbureter thus causes a corresponding decrease in the amount of coal used in the generator and if the otherwise waste heat in the gas leaving the apparatus is utilized for the purpose the result is a clear gain in economy of fuel.

### Variation in Checker Brick Temperature Lessened

The work of heating, vaporizing and gasifying the oil lowers the temperature of the checker-brick in the carbureter and superheater continuously from the beginning to the end of a "run," and this cooling effect is naturally greatest at the top of the carbureter, where nearly all of the heating and evaporating of the oil is done. It is evident that, to obtain the best results, the temperature of the checker-brick should be kept throughout the run, as nearly as possible, constant and at the point best suited to the oil being used, and that any variation of the temperature from this point means a change in the conditions under which, and, consequently, probably a change in the efficiency with which, the oil is being gasified. Preheating the oil lessens this variation in temperature and therefore enables the oil to be gasified more efficiently. It would sem that when the oil is heated to a high temperature, the checker-brick the carbureter and superheater should be kept at a lower temperature than when cold oil is used, in order to prevent the overheating and excessive breaking down of the heavy hydrocarbons derived from the oil.

It should be noted, however, that, on account of its partial vaporization, oil when heated to a high temperature is harder to spray evenly into the carbureter and that, consequently, some engineers prefer to use the oil without preheating it.

### Cleaning the Checker Brick

106. How do you determine when the checker-bricks in a carbureted water-gas apparatus need cleaning?

Ans. The checker-bricks of a carbureted water-gas apparatus should be removed and cleaned, or renewed, when dirty or crushed, or disintegrated. Checker-bricks may become covered with a non-conducting coating of ashes or carbon, or both, making impossible the desired exposure of the oil vapors to properly heated brick surfaces.

(Twentieth Installment Next Week)

## THE FUEL OF THE FUTURE—WHAT SHALL IT BE?

(Continued from page 429)

exposure of the wall is generally taken into consideration as well, that is, whether the wall faces the north, south, etc. Factors are used for multiplying the B.t.u., thus obtained in order to arrive at a more accurate value of the heat loss. The final value is then A in the general equation, $H = A + B - C$.

### Factor Tables

In calculating the heat loss through walls, ceilings, windows, etc., it is much more convenient to use tables that have been calculated for this purpose. The following table is a rather complete one and was taken from Heating and Ventilating, by Hubbard.

**Heat Losses in B.t.u. Per Square Foot of Surface Per Hour—Southern Exposure**

| Material | Difference between inside and outside temperatures | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8-inch wall | 5 | 9 | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 45 |
| 12-inch wall | 4 | 7 | 10 | 13 | 16 | 20 | 23 | 26 | 30 | 33 |
| 16-inch wall | 3 | 5 | 8 | 10 | 13 | 16 | 19 | 22 | 24 | 27 |
| 20-inch wall | 2.8 | 4.5 | 7 | 9 | 11 | 14 | 16 | 18 | 20 | 23 |
| 24-inch wall | 2.5 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 28-inch wall | 2 | 3.5 | 5 | 7 | 9 | 11 | 13 | 14 | 16 | 18 |
| 32-inch wall | 1.5 | 3 | 4.5 | 6 | 8 | 10 | 11 | 13 | 15 | 16 |
| Single window | 12 | 24 | 36 | 49 | 60 | 73 | 85 | 93 | 110 | 122 |
| Double window | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 62 | 70 | 78 |
| Single skylight | 11 | 21 | 31 | 42 | 52 | 63 | 73 | 84 | 94 | 104 |
| Double skylight | 7 | 14 | 20 | 28 | 35 | 42 | 48 | 56 | 62 | 70 |
| One-inch wooden door | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| Two-inch wooden door | 3 | 5 | 8 | 11 | 14 | 17 | 20 | 23 | 25 | 28 |
| Two-inch solid plaster partition | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| Three-inch solid plaster partition | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Concrete floor on brick arch | 2 | 4 | 6.5 | 9 | 11 | 13 | 15 | 18 | 20 | 22 |
| Wooden floor on brick arch | 1.5 | 3 | 4.5 | 6 | 7 | 9 | 10 | 12 | 13 | 15 |
| Double wooden floor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Walls of ordinary wooden dwelling | 3 | 5 | 8 | 10 | 13 | 16 | 19 | 22 | 24 | 27 |

In the case of solid stone walls it is necessary to multiply the brick figures by the factor 1.7. Where the rooms have a cold attic above or a cellar beneath, multiply the heat loss through walls and windows by 1.1.

### Correction for Construction of House

The figures in the above tabulation apply only to houses in which the construction work is of the best and in which there is no leakage. For the average well-built house it is necessary to increase the factors by about 10 per cent to take care of the leakage; for fairly good construction, the increment factor must be 20 per cent and for houses of poor construction, 30 per cent. This takes care of the leakage through the cracks in the walls, joints, etc.

### Correction for Exposure

It will be noticed that this table applies to walls, etc., that have a southern exposure. The following table gives the multiplying factors, by which each of the figures in the above table must be multiplied, in accordance with the exposure of the walls:

| Exposure | Factor |
|---|---|
| North | 1.32 |
| East | 1.12 |
| South | 1.00 |
| West | 1.20 |
| Northeast | 1.22 |
| Northwest | 1.26 |
| Southeast | 1.06 |
| Southwest | 1.10 |
| North, east, south and west or total exposure | 1.16 |

It will be understood that these figures are not arbitrary and are the result of experiment and observation on the part of heating engineers. They represent what is considered best practice.

### Use of the Tables

In determining the amount of heat that will have to be supplied to a room or house in order to keep a minimum inside temperature, when the temperature of the outside air is also at a minimum, a great many different factors and conditions must be taken into consideration. Thus, for example, it is well known that the walls of a building are made up of several layers, one right up against the other or else separated from one another by air spaces. There may be a layer of brick, then one of mortar, another of corkboard, another of cement or plaster finish and finally one of wall paper. The transmission of heat through such walls will depend on the manner in which they are constructed and the material from which they are made.

Furthermore, as has been mentioned, there is also to be taken into consideration the loss of heat due to

the leakage of air through the cracks in the walls, windows, joints, etc. It is really impossible accurately to calculate just how much heat is lost in this way and the best and most convenient practice is to assume a certain percentage increase of the heat transmission through the wall to take care of the leakage. This does not take into consideration the heat that is required to bring the air circulated through the rooms of the house for ventilating purposes, up to the desired inside temperature.

### Heat Loss Through a Brick Wall

The use of the tables given above will be clear from a consideration of the following examples:

Let us assume that the inside temperature of the air is 60 degrees F., that the exposed wall surface of the room is 400 square feet and that the glass surface in the windows is 100 square feet. What will be the heat loss through the walls and windows if the outside temperature of the air is 20 degrees F.? The wall is made of brick and is 8 inches in thickness. It is also assumed that the windows are single, the construction of the house the best possible, so that no consideration need be taken of heat loss due to air leakage. The room has southern exposure.

From the heat loss table given above, it is seen that the B.t.u. transmitted per square foot of surface area per hour for an eight-inch brick wall, when the temperature difference between the inside and the outside wall surface is 40 degrees F., is 18 B.t.u. For the same temperature difference in the case of single windows the loss of heat is 49 B.t.u. per hour per square foot surface. Therefore the total heat loss will be as follows:

$40\times18=7{,}200$ or loss through walls.

$100\times49=4{,}900$ or loss through windows.

The total loss of heat per hour is therefore 12,100 B.t.u. This means that in order to maintain the temperature at 60 degrees F. within the aforementioned room, when the outside temperature is 20 degrees F., there will have to be furnished 12,100 B.t.u. per hour to take care of the loss of heat through the walls and windows without any air leakage. It will be understood that the factors which are used in this calculation and which are taken from the table given above take into consideration the effect of the velocity of the air in increasing the heat loss from the external surface of the walls and windows.

### Modifications of the Example

If the wall exposure had been north instead of south, then both the factors 18 and 49 would have to be multiplied by another factor 1.32 or in other words the total heat loss, 12,100, must be multiplied by 1.32, which gives a total loss of approximately 16,000 B.t.u. per hour, an increase of 32 per cent on the heat loss when the exposure was southern. Then, again, if the house were not so well built, but only of fair construction, there would be a certain amount of air leakage which would also consume heat. This then means that the figures 18 and 49 must first be increased by 20 per cent to 21.6 and 58.8, respectively. Then the heat loss will be $400\times21.6$, or 8,640 B.t.u., through the walls, and $100\times58.8$, or 5,880, through the windows, making a total of 14,520 B.t.u. per hour. This loss would then have to be multiplied by 1.32 to give a total of 19,200 B.t.u. per hour through the northern exposure wall and windows of the fairly well constructed house.

### Heat Loss Through Corner Rooms

When calculating the heat loss through the walls of a corner room, the mathematics becomes a little more complicated. Thus, let us suppose that the room in question has a height of 15 feet and is 20 feet square, having both a northern and western exposure, that is, there is a wall facing the north and another adjoining wall facing the west. There are two windows in the room, one on each wall, and each five feet high and three feet wide. It may also be supposed that one of these windows is a double window and the other a single window. It is also known that the walls of the building are made of brick and are thirty-two inches in thickness. The inside temperature of the room is to be kept at 70 degrees F. when the minimum outside temperature is zero degrees Fahrenheit. What will be the quantity of heat that will have to be supplied each hour to this room in order to compensate for the loss of heat through the walls of this room?

### Total Exposed Area Determined First

The first step in the solution of the problem is to find out the total area of exposed surface. Thus, there is the brick wall surface and the glass surface. The surface of the brick wall is found by multiplying 15 by 20 by 2, which gives a total of 600 square feet. The window surface, or, rather, glass surface, is 2 by 5 by 3, or a total of 30 square feet. This leaves a net brick wall surface of 570 square feet.

The difference between the interior and exterior temperatures is 70 degrees Fahrenheit. By referring back to the table of heat losses, it will be found that the factor for a 32-inch brick wall for a temperature difference of 70 degrees is 11, that the factor for a single window for the same temperature differential is 85 and that for a double window under similar conditions is 56.

The heat losses that are incurred are, therefore, as follows:

| | | B.t.u. per hr. |
|---|---|---|
| Brick wall ..... | 570x11 | 6,270 |
| Single window ..... | 15x85 | 1,275 |
| Double window ..... | 15x56 | 840 |
| Total loss of heat..... | | 8,385 |

Inasmuch as the exposure of one wall is north and the other west, the actual exposure is northwest. From the exposure factor table it will be seen that the results must be multiplied by the factor 1.26. Hence the total amount of heat lost through the walls of this room per hour under the aforemen-

tioned conditions becomes 8,385×1.26, or 10,570 B.t.u. approximately.

### Amount of Gas Required to Compensate for Heat Loss Through Walls

The next step in the calculation is to determine the number of cubic feet of gas it will be necessary to burn to compensate for the heat losses through the walls of a dwelling under certain conditions. Let us suppose that the house is made of brick, that the walls are 20 inches thick. The height of the building, 20 feet, and the construction on the outside measures 200 feet all around the four sides, etc. The building may be assumed to be exposed on all four sides and to contain window space equal to one-fifth of the wall space. Both the attic and the cellar are unheated, which is a typical condition. The owner of this house wants the inside temperature to be 70 degrees Fahrenheit at a minimum outside temperature of 10 degrees below zero Fahrenheit.

He goes to the gas company to arrange for a limited demand meter which must be set to deliver a maximum amount of gas under these conditions. How much gas will he have to burn each hour if the B.t.u. value of the gas is 400 per cubic feet, and if he burns the gas under a steam boiler in which the thermal efficiency has been determined to be 80 per cent? (In this calculation it is assumed that there is no heat required to heat up the air employed for ventilation, which is not a practical condition, but which serves for the purpose of the present calculation.)

### The Calculation

The first step is to find the total amount of surface exposed. The linear feet around the periphery of the house being 200 and the height being 20, the total exposed surface is 4,000 square feet. The glass surface is then one-fifth of this, or 800 square feet, which is about the average for an ordinary house. It is also assumed that the windows are single, which is more often the case than double. The net wall surface is therefore 3,200 square feet.

The temperature difference is 80 degrees Fahrenheit, from 70 above zero to 10 below zero. From the factor table it is found that under these conditions for a 20-inch wall and single windows, the factors are 18 and 93 B.t.u. of heat loss per hour per square foot of surface, respectively.

The heat that is lost through the walls and windows is then as follows:

| | |
|---|---|
| Through wall 3,200×18 | 57,600 B.t.u. |
| Through window 800×93 | 74,400 B.t.u. |
| Total heat loss | 132,000 B.t.u. |

### Exposure on All Four Sides

This heat would have been lost each hour if the house had a southern exposure only, that is, when all the other walls except the south were so protected that wind could not get to them. But this is seldom the case and it is much more advisable to assume that the house has exposure on all sides. Hence, the exposure factor will be the average of those for north, south, east and west. In other words, the factors will be one-quarter of the sum of 1.32, 1.12, 1.0 and 1.20 or 1.16. The house has a cold attic and cold cellar and is assumed to be of average, well-built construction. Therefore, the heat loss will have to be increased 10 per cent for each of the first two conditions and 10 per cent for the third condition. Thus the total heat loss will be 132,000×1.16×1.10×1.10×1.20, or 220,000 B.t.u., approximately.

The B.t.u. in a cubic foot of gas is 400 and the thermal efficiency is assumed to be 80, therefore the heat available is 320 B.t.u. in each cubic foot of gas burnt. This means that 685 cubic feet of gas will have to be burnt each hour. On the other hand, if it is assumed that each pound of coal burnt in the furnace will give 8,000 B.t.u., then there will be required 25 pounds of coal per hour.

### Approximate Method of Calculation

It is not always desirable or convenient to carry out this calculation and so there has been devised a very rapid method of determining heat losses through the walls of a building. This consists simply in finding the total number of square feet of exposed surface and multiplying it by 45, which product will give the heat loss in B.t.u. per hour for an inside temperature of 70 degrees Fahrenheit in zero weather.

According to Heating and Ventilating, by Hubbard, this factor is determined in the following manner: The glass surface of the house is assumed to be one-sixth of the total exposed surface, which is about the average glass surface found in the ordinary house. Then each square foot of exposed surface consists of one-sixth glass and five-sixths wall. The heat loss for 70 degrees difference in temperature is

| | |
|---|---|
| Wall 5/6×19 or | 15.8 |
| Window 1/6×85 or | 14.1 |
| Total | 29.9 |

This figure is increased 20 per cent for air leakage (house of moderately good construction), 16 per cent for exposure on all four sides of the compass and 10 per cent for cold ceilings, due to an unheated attic. Hence we have 29.9×1.20×1.16×1.10, or 45 B.t.u. per square feet of surface.

If the temperature difference is 80 degrees, from 70 above zero to 10 below zero, the factor is 50 B.t.u per square foot of surface, and if the temperature difference is from 70 above to 10 above zero, or 60 degrees Fahrenheit, then the factor becomes 40 B.t.u. per square foot of surface.

### Heat Lost in Ventilation

The heat lost through the walls of the building and the heat lost through air leakage have been calculated above. The air leakage is taken into consideration in the factor used to multiply the heat lost through the walls, which factor depends on the manner in which the building is built. There still remains to be calculated the heat loss due to ventilation.

It may be assumed with a good degree of accuracy that one B.t.u. of heat will raise the temperature of one cubic foot of air 55 degrees Fahrenheit from the average temperature, that is, from zero degrees F. to 55 degrees F., or, expressed in other words, 55 cubic feet of air will be raised one degree F. by one B.t.u. of heat. Then, the heat required to raise the temperature of air from the external temperature to the temperature of the room is determined from the following formula:

$$\frac{\text{Cu. ft. air per hr.} \times \text{No. deg. rise}}{55} = \text{B.t.u. required.}$$

The amount of air that is required for ventilating the room or building will, of course, depend on conditions such as have been outlined in the Fuel of the Future, Article No. IX. The factors in the table, given therein, are used in making the calculation to determine the heat that must be consumed in heating up the ventilating air.

Thus, suppose, for example, that the building to be heated is a schoolhouse containing 100 pupils. Then there will be required 1,800 cu. ft. of air per hr. per person for ventilation, which makes a total of 180,000 cu. ft. of air. The temperature is to be kept at 70 degrees F. when the outside temperature is zero degrees F. The formula then reads as follows:

$$\frac{180{,}000 \times 70}{55}$$

which means a total consumption of heat of 229,500 B.t.u. approximately per hour to heat the incoming air to the temperature of the building.

### Recapitulation

It is now clear that the way in which to determine the amount of heat that will be required to maintain the temperature of a building at a given point is first to calculate the heat loss through the walls and windows of the building, taking in consideration the air leakage by the use of a multiplying factor, dependent on the character of the construction of the building, and then to find the heat that is consumed in heating the ventilating air to the room temperature and finally to add the two figures together. This will give the total amount of heat that will have to be furnished per hour, from which there may be deducted the heat that is produced from the human beings and machines, etc., that are in themselves generators of heat. The final figure will then be the net amount of heat that the heating furnace will have to supply under the aforementioned conditions.

### Complete Example of a Heat Calculation

There are many different examples that could be used in making this calculation, but in order to bring in all the different factors that apply, it will be advisable to use an example of a house which is employed for dwelling purposes in order that the most common case, with which the gas engineer comes in contact in figuring house heating business, may be demonstrated.

It is assumed that the house is of wooden construction. It measures 200 feet around the outside and it has three stories, each of which is nine feet in height. The house has all four exposures and the construction is of average quality. The flooring of the house is wooden and is supported on a stone foundation. The cellar is cold and the attic is cold as well. The glass surface is about one-fifth that of the total exposure and the windows are made single. The temperature outside is 10 degrees above zero. It is required to find the total amount of heat that will be required per hour for warming the house to a temperature of 70 degrees F.

In this case both the short and long methods of calculation will be used, so that a direct comparison of the two can be made.

### Long Method of Calculation

In the first place, the temperature difference between the air inside the house and outside the house is 70, less 10 or 60 degrees F. The heat losses per hour per square foot of surface for southern exposure for such a difference in temperature is 16 B.t.u. for wooden building walls and 73 B.t.u. for single windows. The area of wall surface is 200 multiplied by $9 \times 3$, or 5,400 square feet. One-fifth of that area is window space, or 1,080 square feet.

The heat losses will be as follows:

$1{,}080 \times 73 = 78{,}840$ B.t.u. per hour
$4{,}320 \times 16 = 69{,}120$ B.t.u. per hour

which makes a total of 147,960 B.t.u. lost per hour through the walls and windows of the house. But inasmuch as the house has an all-around exposure, this figure must be multiplied by the factor 1.16, which is one-quarter of the four exposure factors. The result is then $147{,}960 \times 1.16$, or 171,630 B.t.u. But inasmuch as the house has a cold attic and cold cellar, the result must again be multiplied by 1.10 for the first condition and 1.20 for the second condition. Then, again, the house is of ordinary construction, and this fact must be taken into account by increasing the heat loss by 20 per cent, which means multiplying the above result by the factor 1.20. The final heat loss will then be 271,860 B.t.u. per hour. It will be necessary to burn a corresponding amount of gas every hour to give that heat as long as the temperature outside remains 10 degrees above zero. If gas of an average available calorific value of 500 B.t.u. is employed, this means that there will have to be burnt approximately 544 cubic feet of gas $\frac{271{,}860}{500}$

### Approximate Method of Calculation

The total exposed surface is 5,400 square feet. This must first be multiplied by 40, which gives a result of 216,000 B.t.u. of heat lost per hour. This figure, after being multiplied by the factors 1.20 to take care of the cold cellar gives a result which compares fairly well with that obtained by the longer calculation, but the approximate method should only be used in the case of dwellings. The more exact

method should be used in computing the heat loss in other types of buildings and also in determining the heating surface that is required for separate rooms.

When a building such as a hospital, church, schoolhouse, theater or auditorium and the like is being considered for heating with gas, it must be remembered that the heat loss incurred in supplying fresh air for ventilation must be added to loss calculated as above. The manner in which this is done has been shown above and need not be gone into in any further detail.

### Conclusion

The calculation of the heat required for heating a house does not stop at this point, for, after the quantity of heat that must be supplied per hour is known, the next step is to compute the area of the grate surface and radiating surface in the furnace which will be necessary to allow the heat in the burning gas to be properly transmitted to the heating agent, whether it is air, steam or hot water. This is a matter of furnace design which will not be taken up at this point. The conditions in each type of furnace will, of course, be different and will require somewhat different treatment.

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## SERVICE SATISFACTORY TO CUSTOMERS

(Continued from page 431)

charged in the bill. As no representative of your company could enter the house to read the meter, the figures given in the bill are fictitious and put in to rob me. You can sue me for the amount if you care to do so, but you won't get a cent of it out of me."

When the letter was brought to the attention of the general manager of the company, he called up the customer on the telephone and said that if he would drop in at the office he would send an inspector with him to his house, which was still closed, to make an investigation of his charges. The customer at once accepted the invitation and the two men proceeded to visit his residence. The inspector first conducted him to a window in the back part of the house through which the meter could be seen resting on a shelf. He asked the customer to climb to the top of the fence near the window and see if he could, by the aid of a flashlight, read the figures on the dial. The man did so and repeated the figures. "I was mistaken in what I said in my letter about reading the meter," he exclaimed when he climbed down, "but the other charge still stands."

The two men then entered the house. The inspector proceeded to examine the electric light bulbs. All switches in the living rooms were closed, but in the bath-room he found one that was open, although the lamp was not burning. Unscrewing the dead bulb, he put a lamp taken from another fixture in its place. Immediately it became illuminated. "You see," said the inspector, "when you closed the house, you left the lamp in the bath-room burning and it continued to burn until the film was burned out."

The owner then recalled with considerable embarrassment that he had shaved in the bath-room the last thing before closing the house for the summer, and admitted that undoubtedly he had forgotten to snap the switch before he left.

"I guess I have made a damned fool of myself," he said, "and I am going right back to the office and apologize and pay that bill." And he did! In this instance courtesy paid, and paid well.

### Keep Faith With Customers

The third principle that contributes to satisfactory service is keeping faith with customers. Employees are often careless. They make promises they do not keep. Important letters remain unanswered. They tell people they will send an inspector to see what is the matter with their gas stoves or mantle burners and then forget all about it. Every man or woman who makes a complaint or asks for a special service and when nothing is done becomes a promoter of ill feeling toward the company.

I once had occasion to write a letter to the gas company serving my apartment about the failure of the oven in the kitchen stove to bake properly. An inspector called, looked at the stove and said it needed a new iron plate at the bottom of the oven, which the company would furnish. Two weeks went by, but no plate came. After that, another inspector showed up and, after examining the stove, went away. During the next four weeks several other inspectors called, but nothing was done to improve the baking qualities of the stove. Finally, I had to write the company that no more inspectors would be admitted—they had become such a nuisance—and that not a thing had been done toward putting the stove in order. The next day the iron plate for the bottom of the oven came. Apparently in this case either the inspectors failed to file reports of their visits or, when they had done so, no attention was paid to them. My experience showed that something was wrong with the gas company's system of handling matters of this kind.

### Check Up the Complaint Department Regularly

How often do you managers of gas companies check up your complaint department to see that it is functioning properly? If all complaints received are forwarded at once to the complaint desk, how are you to know whether they are being attended to unless some executive outside of the department goes over the work done?

I will admit that it is not the easiest thing in the world to assemble a staff of employees every one of whom will possess a willingness to serve and avail himself of every opportunity to do so, will always be courteous to customers and will always keep faith with them by keeping his promises and by seeing that their wants are promptly supplied. The point I am trying to make is this: we cannot expect to give service satisfactory to customers unless our employees do their share, unless they have proper

support from the executives and unless the entire organization works together to achieve the desired results.

No public utility, not even the gas industry, will ever have the good will and confidence of the public unless it deserves them and to deserve them requires untiring diligence and faithful and efficient service.

### Promotion of Customer Ownership

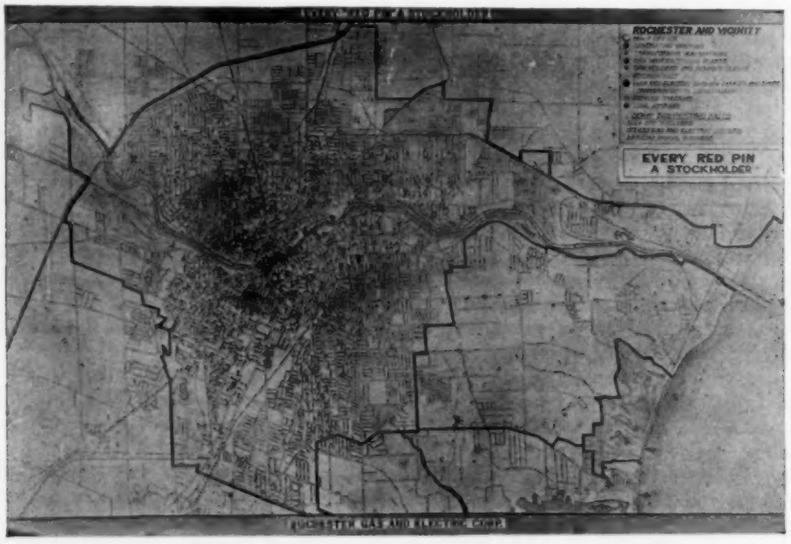
The fourth and last of the elements that contribute to satisfactory service is the promotion of customer ownership. It was not so very long ago when our public utilities were owned by a few capitalists. Today the ownership is vested in a large number of persons. For instance, on March 1, the stockholders of the Pennsylvania Railroad numbered 145,000, of whom 70,000 were women. The Cities Service Company, the subsidiaries of which include quite a number of gas, electric light and power and electric railway companies, have over 100,000 security holders.

Why are corporations conducting extensive campaigns to increase the number of stockholders among their customers? Because they know from experience that when a customer becomes financially interested in the local public utility he becomes a defender and promoter of its interests. The fact that he invests in the company's securities shows that he believes in the solidity and future prosperity of the corporation. If attempts are made to hamper its management or to place unfair restrictions upon its operations, these customer-owners become active opponents of such measures. Moreover, when customers hold a company's securities, they are more lenient in passing judgment upon its acts and while they may not condone or overlook a serious defect in its management, they will make due allowances for ordinary errors of judgment or slip-ups in service.

To feel that a considerable portion of the public you serve is behind your company in its efforts to strengthen its business position or to make additions to, or improvements in its plants, will go a long way towards giving confidence to its officers in times of storm and stress.

# A Map That Sold a Company to City and Stockholders*

One of the many difficult problems faced by public utility companies is to acquaint their stockholders and the general public with the fact that they are really publicly owned. The Rochester Gas and Electric Corporation accomplished this in a rather unusual manner. It constructed an immense map, six




by ten feet, which was originally shown at the local industrial exposition and later displayed in the company's show windows.

It shows the various company properties, which are indicated by different colored lamps, as shown in the upper right-hand corner of the photograph. These lamps are connected to a flasher system which lights up each group consecutively, and then shows them collectively on the final flash. Each flash shows consecutively the main offices, generating stations, transformer sub-stations, gas manufacturing plants, gas holders and pumping plants.

The map was later used at a meeting which was held to better acquaint the stockholders with the company. Such personal interest will go a long way toward getting good will and co-operation from stockholders.

*From Printers' Ink Monthly.

# Current Market Prices

**COALS (By Courtesy of Coal Age)**

**A. Bituminous.**

(Spot prices, F. O. B., mines, net tons).

| High Volatile, Eastern | Market | Price |
|---|---|---|
| Pool 54-64 (Gas Standard)) | New York | $1.40 to $1.65 |
| Pittsburgh screened gas | Pittsburgh | 2.30 to 2.50 |
| Pittsburgh gas, mine run | Pittsburgh | 2.00 to 2.25 |
| Kanawha lump | Columbus | (*) |
| Kanawha mine run | Columbus | (*) |
| West Virginia lump | Cincinnati | 1.75 to 2.25 |
| W. Virginia gas mine run | Cincinnati | 1.25 to 1.50 |
| **Midwest** | | |
| Indiana 4th vein lump | Chicago | 2.75 to 3.00 |
| Indiana 4th vein mine run | Chicago | 2.25 to 2.50 |
| **South and Southwest** | | |
| Big Seam lump | Birmingham | 2.70 to 2.90 |
| Big Seam mine run | Birmingham | 1.75 to 2.25 |
| Southeast Kentucky lump | Louisville | 2.00 to 2.25 |
| Southeast Kentucky mine run | Louisville | 1.25 to 1.75 |

**B. Anthracite.**

(Spot prices F. O. B. mines, gross tons),

| | Market | Freight rates | Independent | Company |
|---|---|---|---|---|
| Egg | New York | $2.34 | $8.75 to $9.00 | $8.35 to $8.75 |
| Egg | Philadelphia | 2.39 | 8.35 to 9.50 | 8.70 to 8.75 |
| Egg | Chicago (net tons) | 5.06 | 7.68 to 7.77 | 7.73 to 7.81 |

**COKE (By Courtesy of Iron Trade Review).**

| | |
|---|---|
| Connellsville, furnace | $3.40 to $4.00 |
| Wise County, furnace | 4.00 to 4.50 |
| Alabama, furnace | 5.00 to 6.00 |
| Foundry, Newark, N. J., del. | 10.41 |
| Foundry, Chicago, ovens | 12.50 |
| Foundry, Boston, delivered | 12.50 |
| Foundry, St. Louis | 12.50 |
| Foundry, Granite City, Ill. | 12.50 |
| Foundry, Alabama | 5.00 to 6.50 |

**PETROLEUM (By Courtesy of Oil, Paint & Drug Reporter)**

(Prices at wells, per bbl.)

| | |
|---|---|
| **Pennsylvania—Ohio—West Virginia.** | |
| Cabell, West Virginia | $2.20 |
| Corning, Ohio | 2.15 |
| Lima | 2.28 |
| Pennsylvania | 4.00 to 4.50 |
| Wooster, Ohio | 2.15 |
| **Indiana—Illinois.** | |
| Illinois | 2.07 |
| Indiana | 2.08 |
| **Oklahoma—Kansas.** | |
| Healdton | .90 |
| Mid-continent (low gravity) | 1.25 |

* No quotation, due to strike.

| | |
|---|---|
| **Gulf Coast.** | |
| Gulf Coast, Grade A | $2.00 |
| Gulf Coast, Grade B | 1.70 |

**GAS OILS.**

| | |
|---|---|
| Gas Oil, Bayonne, bulk gal. | 5½ to 6½c |
| Gas Oil (32-36) Illinois-Indiana, | 5.38 to 5.63 |
| Gas Oil (32-36) Oklahoma, gal. | 3 to 3⅛c |
| Gas Oil (32-36) Gulf Coast, gal | 5 to 5½c |

**PIPE AND FITTINGS—CAST IRON GAS PIPE.**

(By Courtesy Iron Trade Review.)

| | |
|---|---|
| Four-inch, Chicago | $65.20 to $66.20 |
| Six-inch and over, Chicago | 61.20 to 62.20 |
| Four-inch, Birmingham | 57.00 to 58.00 |
| Six-inch and over, Birmingham | 53.00 to 54.00 |
| Four-inch, New York | 70.60 to 71.60 |
| Six-inch and over, New York | 65.60 to 66.60 |
| Standard fittings, Birmingham, base | 115.00 |

6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20.

**BY-PRODUCTS**

**(By Courtesy of Oil, Paint and Drug Reporter)**

| | |
|---|---|
| Ammonia aqua, 16 deg. drums lb. | 5 to 5¼c |
| Ammonia aqua, 20 deg. drums lb. | 6¼ to 6½c |
| Ammonia aqua, 26 deg. drums lb. | 6¾ to 7 c |
| Ammonia squa, anhydrous cylinder, lb. | 30 to 36 c |
| Ammonium sulphate, bulk F. O. B. Works, per 100 lbs. | $2.65 to 2.70 |
| Potash prussiate, yellow casks, lb. | 18 to 19 c |
| Potash prussiate, red casks, lb. | 35 to 37 c |
| Soda prussiate, yellow casks, | 12 to 12½c |
| Soda sulphocyanide, barrels, lb. | 45 to 55 c |

**COAL TAR BASIC PRODUCTS.**

**(By Courtesy of Oil, Paint and Drug Reporter)**

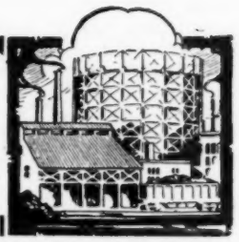
| | |
|---|---|
| Benzol C. P. tanks, works, gal. | 24 to 25c |
| Benzol, drums, gal. | 30c |
| Benzol, 90% tanks, works, gal. | 23c |
| Benzol, 90% drums, gal. | 28c |
| Napthalene, flake, barrels, lb. | 5½ to 6c |
| Napthalene, crushed bags, lb. | 5 to 5½c |
| Solvent Naphtha, water white works, gal. | 24 to 25c |
| Solvent Naphtha, drums, works, gal. | 29 to 30c |
| Toluene, C. P. tanks, works, gal. | 31c |
| Toluene C. P. drums, works, gal. | 36c |

There has been no discernible upturn from the soggy condition prevailing of late throughout the bituminous coal trade. Reports of shutdowns are less frequent, probably for the reason that they could not go much further, but the operations that are working are on low running time. Most of the business being placed is from railroads, with the usual scattered buying accounting for a large proportion of the remainder. Placement of contracts is still noticeably backward.

The wage dispute that caused a shutdown of the union mines of the Southeast was settled May 3 with a victory for the miners, the joint scale committee of miners and operators having agreed to renew the old scale for three years, the only change in the contract being a provision for submitting matters in dispute to an arbitration commission. The operators sought a 20 per cent reduction in wages.

Benzene—An excellent demand existed for benzene. Sales of the motor benzol were in heavy volume, and demand was so persistent that the manufacturers have been turning all their attention that way latterly, to the exclusion of production of certain other distillations. The market was strong in tone under the circumstances and the continuation of the demand has been expected to result in higher prices, as there has been shutting down of some of the ovens.

# NEWS OF THE GAS INDUSTRY



### Gas Plant at Saginaw Put Into Operation

The coal gas plant of the Consumers Power Company at Saginaw, Michigan, was put into operation last week. This plant consists of nineteen small gas ovens and central producer plant, together with the necessary by-product recovery and coal and coke handling apparatus. When the ovens are heated with producer gas the plant will have a capacity of approximately two and one-half million cubic feet of gas per day, based on twelve hours' carbonizing time. This capacity can be reduced instantly to 1,725,000 cubic feet by substituting coal gas for underfiring the ovens, instead of producer gas, and can be further decreased by lengthening the carbonizing time. The plant can be operated at any capacity between these figures by heating any desired number of ovens with producer gas and the remainder with coal gas. The ovens and producer plant were designed and built by the Koppers Company.

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### Natural Gas Association to Meet

The success of the nineteenth annual convention of the Natural Gas Association of America, to be held in the Public Auditorium, Cleveland, Ohio, May 19 to 22, inclusive, is not a conjecture, but an assured fact, judging from the extremely lively interest already manifested in the affair and the increasing enthusiasm which is noted among the members of the gas fraternity.

Secretary-Treasurer Wm. B. Way has arranged a most interesting program for the four days the convention will hold forth. Many interesting papers will be read and a number of interesting speakers will be heard. Among the latter are A. C. Bedford, chairman of the board of directors of the Standard Oil Company of New Jersey, and Dr. Irving Fisher, professor of political economy, Yale University.

## First Chair of Gas Engineering in America Established by Southern Gas Association

During the closing hours of its annual convention last week in Augusta, the Southern Gas Association completed the financing of its Gas Engineering Chair proposition, which it has been working on for two years. The chair will be established at Johns Hopkins University and its work will be inaugurated at the opening of the university the coming fall. The university agreed to establish the enterprise provided the Southern Gas Association would pledge towards its support $8,000 a year for a period of five years. There is actually pledged $8,020.50 a year.

Perhaps the underwriting of the chair might have been accomplished in shorter time; but while the association was moving along financial lines it was trying to thoroughly "sell" the higher ideals of the enterprise to its membership and constituency, with the result that a number of the brightest young men in its territory already are planning to enter the course at the university. The association will not rest on its oars now that the financing is provided; it will make a continual effort to influence the right sort of students to take the work, to the end that the constituency in the gas business, in its territory, may be gradually but surely elevated in training and efficiency. This is one of its real goals.

**Annual Subscription for Five Years**

| | Subscription |
|---|---|
| Alabama— | |
| St. Augustine Gas & Electric | $35.00 |
| Jacksonville Gas | 80.00 |
| Orlando Public Service | 50.00 |
| Tampa Gas | 80.00 |
| Palatka Sou. Utilities | 25.00 |
| Pensacola Gas | 50.00 |
| Georgia— | |
| Georgia Ry. & Power | 300.00 |
| Augusta Gas Light | 100.00 |
| Savannah Gas | 200.00 |
| Macon Gas | 100.00 |
| Columbus Elec. & Power | 50.00 |
| Athens Gas Light & Fuel | 30.00 |
| E. D. Brewer | 12.00 |
| W. H. Taylor | 10.00 |
| F. L. Marshall | 15.00 |
| Valdosta Gas | 50.00 |
| District of Columbia— | |
| Washington Gas | 300.00 |
| Edgar Morris Sales | 50.00 |
| Harold A. Willard | 10.00 |
| Louisiana— | |
| N. O. Public Service | 100.00 |
| West Virginia— | |
| Bluefield Gas & Power | 50.00 |
| A. C. Reese | 10.00 |
| North Carolina— | |
| Concord & Kannapolis | 14.00 |

| | |
|---|---|
| Yadkin River Power | 64.00 |
| Sou. Public Utilities | 200.00 |
| R. J. Hole | 25.00 |
| R. J. Hole (pledge for N. C.) | 397.00 |
| South Carolina— | |
| Charleston Cons. Ry. & Lt. Co. | 300.00 |
| Sumter Gas & Power | 50.00 |
| Anderson Gas | 12.50 |
| Tennessee— | |
| Nashville Gas & Ht. | 150.00 |
| Knoxville Gas | 100.00 |
| Brostol Gas & Elec. | 25.00 |
| S. E. Linton (underwritten) | 96.00 |
| Maryland— | |
| Cons. Gas, Elec. Lt. & Power | 1,000.00 |
| Maryland Meter Works | 500.00 |
| Baltimore Gas Appliance & Mfg. Co. | 500.00 |
| E. L. Rieha | 25.00 |
| L. Irving Pollitt | 500.00 |
| J. B. Sexton Stove Co. | 50.00 |
| Virginia— | |
| Suffolk Gas-Electric | 50.00 |
| Petersburg Gas | 100.00 |
| Portsmouth Gas | 100.00 |
| Norfolk City Gas | 200.00 |
| Roanoke Gas | 100.00 |
| T. Edgar Grace and E. T. Boyett | 15.00 |
| Lynchburg Foundry Co. | 50.00 |
| Pittsburgh— | |
| Ruud Manufacturing Company | 100.00 |
| Bridgeport— | |
| Sprague Meter Company | 100.00 |
| Columbus— | |
| Lattimer-Stevens Company | 35.00 |
| Philadelphia— | |
| John J. Griffin Company | 50.00 |
| Welsbach Gas Lamp | 25.00 |
| Roberts Mander Stove Company | 20.00 |
| Helme & McIlhenny | 50.00 |
| Southern Gas & Power | 200.00 |
| St. Louis— | |
| Russell Engineering Company | 50.00 |
| Cincinnati— | |
| Stacey Mfg. Co. | 500.00 |
| Frank Stacey | 10.00 |
| Milwaukee— | |
| Milwaukee Gas Specialty | 15.00 |
| New York— | |
| Alfred I. Phillips | 10.00 |
| Wm. M. Crane Company | 50.00 |
| Maj. Alexander Forward | 25.00 |
| General Gas Light | 100.00 |
| *American Gas Journal* | 50.00 |
| New Castle— | |
| George M. Cressler | 50.00 |
| Southern Gas Association | 250.00 |
| Total | $8,020.50 |

Annual requirement, $8,000.00.

### Gas Goes to $1 in Detroit

Detroit gas rates were fixed at $1 per thousand cubic feet for customers using 1,200 cubic feet or less per month, and at 75 cents for customers using up to 50,000 cubic feet, under a decision by arbitrators appointed by the municipality and the Detroit City Gas Company. The average rate under the old schedule was 74 cents a thousand, which the company contended was too low. No minimum charge was fixed. The report of the arbitrators also provided that the company shall apply gas of a quality of 530 B.t.u., instead of 600.

### Public Service Company of Colorado Financial Report

Denver, Col.—The Public Service Company of Colorado, which absorbed the Denver Gas and Electric Light Company and some other concerns on October 1, 1923, in its report for the first three months of consolidated operation, the last quarter of 1923, shows:

| | |
|---|---|
| Gross from operation | $2,131,439 |
| Operat'g expenses, taxes, etc. | 1,279,229 |
| Net from operation | $ 852,210 |
| Non-operating income | 26,873 |
| Net for int., div. and reserve | $ 879,083 |
| Total int. charges | 381,898 |
| Net available for div. and reserve | $497,185 |

The interest on the bonded indebtedness was earned two and one-third times. Both the gas and electrical departments showed a substantial increase, gas leading by having increased in the send-out by 32 per cent. The gas increment is due to house heating, hotels and restaurants using gas for cooking. Three hundred and eight residences are being heated with gas in Denver.

### Illinois Power Corp. Acquires Central Illinois Electric Co.

Chicago, Ill.—The Illinois Power and Light Corporation has acquired the property of the Central Illinois Electric Company.

# Laclede Gas Light Company Bought by C. A. Munroe and Associates

The Laclede Gas Light Company on May 1 issued the following statement:

"Arrangements were concluded today whereby a majority of the common capital stock of the Laclede Gas Light Company has been acquired by Charles A. Munroe, vice-president of the People's Gas Light and Coke Company, Chicago, and his associates. The interests associated with Mr. Munroe are the Koppers Company of Pittsburgh, the Guaranty Company of New York and Mr. T. B. Maculay and Sir Herbert Holt of Montreal.

"Mr. Munroe is expected to retire from the vice-presidency of the People's Gas Light and Coke Company to become chairman of the board of directors of the Laclede Gas Light Company and to devote his time and attention to the extension of its business."

### Mr. Munroe's Statement

Mr. Charles A. Munroe, in a statement, said:

C. A. Munroe

"A majority of the common stock of the Laclede Gas Light Company has been acquired by myself and associates as an investment. After a very thorough examination of the property and future prospects of the city of St. Louis, it was believed that this company offered a safe and satisfactory investment opportunity.

"The Laclede Gas Light Company has a reputation in the gas industry as being one of the most forward gas companies in the industry and its engineering department has been repeatedly pointed to as a standard for other companies. Notwithstanding the present efficiency of the company, with the help and co-operation of its organization, it can be made better and its field of service enlarged.

"The company will be run and operated by St. Louis people and owned by St. Louis people to a greater measure than ever before in its history. It is the expectation that the customers of the company will be permitted to share in its earnings through an opportunity being offered them to purchase its securities. All of these factors in the plan cannot help but be of great benefit to the company and to the people of St. Louis whom it serves."

### People's Gas Co. of Chicago Not an Interested Party

It has been variously rumored while the negotiations for the sale of the securities have been in progress that the People's Gas Light and Coke Company of Chicago was an interested party to the transaction. Mr. Munroe, upon being asked as to this, said:

"Neither the People's Gas Light and Coke Company nor Mr. Samuel Insull has any financial interest, directly or indirectly, in the Laclede Gas Light Company."

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### Atlantic City Meeting of Public Utilities Advertising Association

A meeting of the officers, directors and members of the Public Utilities Advertising Association is called for 8:30 p. m., Thursday, May 22, in the Blue room, ground floor, Hotel Chalfonte, Atlantic City, N. J.

The evening hour has been decided upon so as not to conflict with regular business sessions of the N. E. L. A. convention and the meeting will be short enough to enable members to participate in the entertainment program on the Million Dollar Pier.

### John Clifford Page Passes Away —Succeeded by N. R. McKee

Portland, Ore.—John Clifford Page, purchasing agent for the Southern Counties Gas Company of California for the past seven years, and a man widely known in public utility circles of Los Angeles, died very suddenly on March 29. He was on his way home when he was stricken and passed away within a few minutes from heart disease.

Page was born on March 26, 1875, at Memphis, Tenn. He was educated in the public schools of that city and came to Los Angeles in 1894. He became an employee of the local telephone company in 1897 and in two years was transferred to Pomona, where he was district manager for the Pomona Telephone Company. From 1900 to 1906 he held a similar position with the Consolidated Telephone Company at Phoenix, Ariz.

Returning to Los Angeles in 1906 he entered the real estate business, following that activity until 1915. In September of that year he joined the forces of the Southern Counties Gas Company at Santa Ana as chief clerk of the Santa Ana office. During 1916 he had charge of new business and sales in that district.

J. C. Page was a man of wide experience in the public utility business and had devoted his life to the public service. In seven years the growth of his department from a small one to its present size with annual purchases running well over the $1,000,000 mark are the best evidences of Mr. Page's ability as the purchasing agent of a large corporation. He enjoyed the confidence of the officials of the company and had a host of friends both inside and outside of the organization who mourned his death. Mr. Page was a member of the Masonic order, of the City Club, the Pacific Coast Gas Association, and took an active part in the activities of the local organization of purchasing agents.

He leaves a widow, Mrs. Gertrude Hart Page; a mother, Mrs. Anna A. Page; two sisters, Mrs. Albert Crutcher, head of the Children's Hospital, and Mrs. Willoughby Rodman, prominent Southern California club woman; and a brother, James R. Page, well known local broker, of the firm of Stevens, Page & Sterling.

### N. R. McKee Succeeds as Purchasing Agent

N. R. McKee, formerly sales engineer of the Southern Counties Gas Company of California, and an employee of that public utility since 1915, has been appointed purchasing agent for the company, to succeed J. C. Page, who died suddenly in Los Angeles on March 29. McKee assumed the duties of his new position on April 1.

N. R. McKee

From 1907 to 1913 McKee was with the Associated Oil Company in the Santa Maria oil fields. He was in the pipe line department or producing end. From 1913 to 1915 he was with the Standard Oil Company of California, stores or refining department.

In 1915 he joined the Southern Counties Gas Company organization. Early in the following year he was made district superintendent of the Santa Monica Bay District, which position he held until November of 1918. At that time he was transferred to the company's general offices, Los Angeles, to become sales engineer. He has held this position to April 1 last, when he was made purchasing agent for the company.

Mr. McKee, although a young man, has had wide experience fit him for his present position. He is an active member of the Pacific Coast Gas Association and is chairman of the committee on arrangements for the 1924 convention to be held in Santa Barbara during September.

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### Congress to Add to Distribution Costs — Industry Threatened by Pending Legislation

Chicago, Ill.—Every person engaged in industry—whether worker, financier or manager—will be affected by the legislation introduced into Congress this session by Congressman Paige and Congressman Kelly.

Although it is generally conceded that at the present time costs of distribution are too high, these bills will add as much as 200 per cent to one of the generally used methods of distribution—parcel post.

The Kelly bill is concerned mostly with increasing the salary of postal employees—a very worthy cause for which considerable agitation and sentiment has been worked up. Under pressure of this sentiment and agitation, the bill will most likely be passed because strong pressure will be brought to bear on Congressmen in its behalf.

The Paige bill proposes to raise the money for the payment of these increases in salary. But instead of making a careful and scientific analysis of what would be just and equitable, the bill proposes to saddle the entire expense heavily upon industry by arbitrarily increasing postal rates, which in some instances are three times as high as at present in existence.

Postmaster-General New has pointed out the folly of proceeding in this manner because his department has been conducting investigations into costs with the object of making readjustments in postal charges on a scientific basis. He advocates that no change in the rates be made until the report of his department is received, probably in July or August.

If postal salaries are to be increased (and it would seem that

this should be done) the increase will be safer, surer and more equitable if it is made after the report of the committee investigating the facts in the case.

### Gas Co. Establishes Industrial Agents Department

Hammond, Ind.—Establishment of an industrial agents' department in the Northern Indiana Gas and Electric Company has been announced.

This new department is created for the purpose of co-operating with local Chambers of Commerce and other business men's organizations in getting new industries to locate in the communities in which the companies operate.

The head of the new department is C. H. Wheeler of Gary, Ind. Mr. Wheeler has had several years' experience in similar work for eastern railroads, but for the last fourteen years was connected with the Illinois Steel Company at the Gary Works as superintendent of blast furnaces and docks.

Previous to that he was for five years vice-president and general manager of the Jackson Iron and Steel Company of Jackson, Ohio. Before that he was chief engineer of the Buffalo Street Railway. His long experience in the steel industry and in public utility and railroad work has given him a wide acquaintance with executives of industrial concerns throughout the country.

The office of the industrial agent's department will be in the Public Service building in Gary, but direct contact with industrial developments in each community will be maintained by a representative of the department in each local office.

### An Aid in Industrial Development

In establishing this new department the Northern Indiana Gas and Electric Company is taking another step in its program of aiding in the industrial development and growth of the communities which it serves. Early this year the company issued an illustrated booklet entitled "The Workshop of America," in which the industrial advantages of the territory which it serves were emphasized. In its advertising the company has featured the rapid industrial development of the territory and its future possibilities.

The new industrial agents' department will keep in touch with industrial developments and contemplated expansions or moving of factories and plants and will endeavor to interest heads of industrial concerns in locating in communities served by this company.

The advantages of each community served will be listed and information will be gathered in reference to possible factory sites, housing and labor conditions and other data which will be of interest to manufacturers. It is not the purpose of the new department to boost any particular community, but to work with local Chambers of Commerce in all cities and towns for the purpose of exploiting the territory as a whole and to be of assistance whenever possible in local situations.

### New Pipe Line Equipment Catalog

Joseph G. Pollard Co., Inc., Brooklyn, N. Y., have recently issued their catalogue No. 10, in which is illustrated and described a line of equipment for the main laying department of gas companies. It includes sulky derricks, chain hoists, pipe tripod derricks, kerosene burners, for water and gas mains, the whole outfit being mounted on wheels. Practically every appliance that can be used is illustrated and described in this catalogue, a copy of which will be sent on request.

### Carson Is Named President of Iowa Gas Association

Sioux City, Ia.—H. J. Carson, manager of the Cedar Rapids Gas Company, Cedar Rapids, Iowa, will direct the activities of the Iowa District Gas Association for 1924-25. Mr. Carson was elected president of the association at its nineteenth annual convention.

The Iowa district includes gas manufacturers of Iowa, Nebraska, Minnesota, North and South Dakota.

Other officers named at the convention were: C. M. Benedict of Des Moines, first vice-president; F. S. Edge of Grinnell, second vice-president, and H. R. Sterrett of Des Moines, secretary and treasurer. Members of the executive council are H. L. Greene of Waterloo, B. W. Copperthwaite, Faribault, Minn., and E. H. Vieregg, Grand Island, Neb.

The 1924 convention was the largest and most successful meeting in the history of the association. Two hundred delegates registered for the sessions.

### New Contracts Awarded

The Northampton Gas Light Company of Northampton, Mass., has placed an order with the Gas Machinery Company of Cleveland, Ohio, for an eight-foot water gas generating equipment and auxiliary apparatus.

The Gas Machinery Company installed an eight-foot water gas set in Northampton a few years ago, but the sales of gas increased to the point where additional equipment is necessary.

The Gas Machinery Company of Cleveland, Ohio, has been awarded a contract to install a new seven-foot six-inch water gas generating equipment and auxiliary machinery in the gas plant at Hagerstown, Maryland. The order includes explosion check valve, gas connections and other auxiliary equipment.

### Gas Company Shows Profit

Lodi, Cal.—The Sacramento Gas Company, operating in Sacramento and Lodi, reports to the Railroad Commission for the year 1923 that its operating revenue was $235,495.43; operating expenses, $182,370.54, giving a net operating revenue of $53,124.89. Miscellaneous non-operating revenue amounted to $2,098.03. Interest, rent and other deductions totaled $24,530.32. The net corporate income for the year was $30,683.60. The surplus at the beginning of the year amounted to $37,154.32. Miscellaneous additions to surplus for 1923 amounted to $24.90 and miscellaneous deductions were $3,282.21.

The company declared dividends of $25,846 during the year, leaving an accumulated surplus at the end of the year of $38,834.61.